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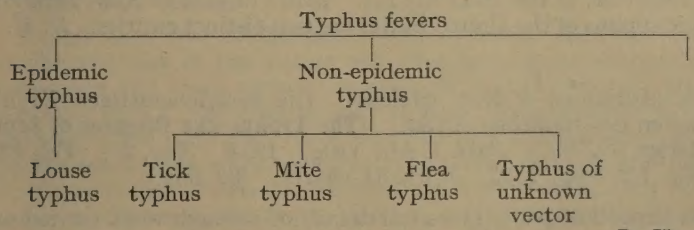
THE TYPHUS GROUP OF FEVERS.

MEGAW (John). **Typhus Fevers in the Tropics.**—*Brit. Med. Jl.* 1934. Aug. 11. pp. 244–246.

This paper was read in opening the discussion in the Section of Tropical Diseases at the Annual Meeting of the British Medical Association at Bournemouth in July 1934. It deals with typhus fever and especially the typhus fevers of the tropics from the historical, clinical and epidemiological points of view.

The author refers to his original observations in India in 1916 when he himself suffered from a definite attack of a typhus-like fever and was able to state that he had been bitten by a tick some 3 weeks before [see this *Bulletin*, Vol. 9, pp. 489–91]. In so far as this disease in India is concerned we are pretty much in the same position as we were some 20 years ago; that is to say similar cases are being described from time to time and in some it is stated "there was a clear history of tick bite," in others "no evidence could be obtained of the patient having been bitten by a tick." [It would be interesting if an investigation could be made in India on the lines of investigations made in America, France, South Africa and elsewhere which have shown that in similar diseases met with in these countries emulsions of infected ticks when inoculated into laboratory animals produce the disease.]

General Megaw suggests again that the simplest and most comprehensive classification of the typhus diseases is by means of the vector, as follows :—



D. Harvey.

OTTO (R.). Flecktyphus und endemische Fleckfieber. [**Epidemic or European Typhus and Endemic Typhus.**]—*Deut. Med. Woch.* 1934. Aug. 31 & Sept. 7 Vol. 60. Nos. 35 & 36. pp. 1299–1303; 1341–1344.

The first paper is a review of recent work on typhus fever dealing with the old world typhus and Brill's disease, Japanese River fever and

Rocky Mountain fever and tropical typhus. The subject of Rickettsia is also discussed and the various vectors—louse, rat, flea and mite. There is no new matter.

The second paper deals with immunity and serum reactions, especially the Weil-Felix reaction. Tables are given dealing with the diagnostic points between endemic and epidemic typhus and the question of the differentiation of the viruses is discussed. *D. H.*

ZINSSER (Hans). Sur la maladie de Brill et le réservoir interépidémique du typhus classique. [**Brill's Disease and the Interepidemic Reservoir of Classical Typhus.**]—*Arch. Inst. Pasteur de Tunis.* 1934. July. Vol. 23. No. 2. pp. 149–154. [12 refs.]

The author discusses the question of the unity of the typhus viruses; he is of opinion that the classical or human virus and the rat virus are two varieties of the same species which resemble one another in their antigenic properties but are not identical. He has studied two strains of the classical virus for several years but has never succeeded in transforming permanently the classical (human) virus into the rat virus.

A close study of 3 strains of virus obtained from 3 cases of Brill's disease has shown that all are of the classical or human type. It has also been shown that since 1910 some 500 cases of Brill's disease have occurred in New York and that 97·8 per cent. of these have been in Jewish immigrants from Europe and specially from Russia, Poland, and Rumania, centres of classical typhus in Europe. Brill's disease is therefore practically non-existent in people born in America and does not spread to them. In no instance was a second case noted in a family and there was no evidence of occupational infection. From these facts the author adduces that Brill's disease (classical virus) is not derived from a reservoir in the rat nor from any other source which could spread the disease to the local community from the immigrants.

The conclusion is that Brill's disease is classical typhus maintained in man, and that it is a recrudescence or relapse of a true typhus originally contracted in Europe.

Thus we have in America the two viruses of typhus. In the one man is the reservoir, in the other the rat. Brill's disease of New York and endemic typhus of the United States are two distinct entities. *D. H.*

PIJPER (Adrianus) & DAU (Helene). Die fleckfieberartigen Krankheiten des südlichen Afrika. [**The Typhus-like Diseases of South Africa.**]—*Zent. f. Bakt.* I. Abt. Orig. 1934. Nov. 20. Vol. 133. No. 1/2. pp. 7–22. With 51 charts. [62 refs.]

This important paper gives full details of research work carried out in the laboratory of the senior author in Pretoria, South Africa.

There are three types or varieties of typhus-like disease in South Africa; these resemble similar diseases described in other countries but are not identical. 1. Tick bite fever. 2. Epidemic typhus. 3. Sporadic typhus.

Tick Bite Fever.—This name was originally given by NUTTALL to the disease which was first described by SANT'ANNA in 1911. The disease is conveyed to man by larval ticks and the following have been shown

by the authors to be capable of transmitting the virus :—(*a*) *Amblyomma hebraeum.* (*b*) *Rhipicephalus appendiculatus.* (*c*) *Boophilus decoloratus.*

These small ticks climb on to the stalks of grass and attach themselves to man or animals ; they are veldt dwellers and are not found in houses or on domestic animals ; the reservoir of the disease is probably the small rodents of the veldt. In this respect the disease resembles Rocky Mountain fever and Indian tick typhus but differs from boutonneuse fever. Injection of emulsion of these ticks produced the disease in man and animals and a rising titre of agglutination for Proteus X strains. Section of such ticks revealed the presence of Rickettsia in the malpighian tubules. In nature man is infected by the bite of the tick but infection may also be conveyed through the conjunctiva.

Two forms are met with, the mild or abortive form and the fully developed form. In the first the only symptom noted may be the presence of a primary sore at the site of the bite accompanied by a local lymphangitis. In the fully developed form the fever lasts for 8 to 10 days with primary sore, severe headache, appearance of a typical rash on the 5th day, stiffness of the neck and conjunctivitis. Typical temperature charts are shown. The primary sore is similar to that found in Japanese River fever and in boutonneuse fever and when found is pathognomonic ; when the sore is situated between the toes or in a scrotal fold it may escape detection. This fully developed form of tick bite fever has previously been confused with typhus, meningitis, measles or typhoid fever.

Agglutination tests.—The sera of 85 cases of the disease were tested with the O variants of X19, X2 and XK, and tables are given in the text with detailed results of 28 of these ; the chief points noted are that there is a definite positive Weil-Felix reaction with rising titre of agglutination usually for all of the 3 variants of Proteus X employed. In some cases, but not in all, XK was agglutinated in higher titre than X19 but the serum of one and the same case may at one time agglutinate X19 in higher dilution and at a later date in convalescence XK, or conversely, On the whole, it is stated, the agglutination results are, in the sense of FELIX, in the nature of group reactions and the major antigen for this disease is still to seek. These remarks apply in considerable degree to the same reactions in the epidemic and sporadic types in South Africa.

Experiments with Guineapigs.—5 cc. of blood taken from patients on the first day of the disease was inoculated intraperitoneally into guineapigs and these animals reacted, after an incubation period of 5–6 days, with a very definite fever although they were not ill, did not lose weight and none died. The animals which had reacted to the virus did not react again when tested six weeks later although controls duly developed fever. The results of these experiments are clearly shown in numerous figures in the text. Animals which were killed during the fever showed enlargement of spleen and adrenals, hyperaemia of the brain, endothelial proliferation, and some slight swelling of the scrotum ; rickettsia were demonstrated from smears of the tissues. The virus was readily passaged through many generations in guineapigs, employing as a rule emulsion of brain as inoculum. The fever in guineapigs was further controlled by :—(*a*) Immunity tests ; (*b*) inoculation of emulsion of brain into rabbits with production of agglutinins in the serum ; (*c*) reinoculation of the virus from guineapig to man.

Mixture of immune serum with the virus prior to inoculation neutralized the virus ; it was found that Rocky Mountain fever antiserum had no action on the virus of tick bite fever nor vice versa. Rabbits when inoculated with the virus developed agglutinins for all 3 variants, X19, X2 and XK.

Epidemic or Louse-borne Typhus.—The authors have studied the virus of this disease on the same lines. The results of the Weil-Felix reaction showed that the high titres for X19 met with in European cases are not found here ; indeed the reaction, as already said, seems to be rather of the nature of a group reaction. Rabbits inoculated with this virus gave the same reaction as with tick bite fever virus ; and the results of inoculation of the virus into guineapigs also varied somewhat from that usually obtained with the epidemic virus.

A sporadic type similar to endemic typhus described elsewhere is also met with in South Africa, but here also the results of the Weil-Felix reaction in patients' serum is similar to that obtained in cases of the epidemic type by the authors ; XK may also be agglutinated. The virus both from cases of the disease and from rats caught in districts where cases had occurred was studied ; this rat virus was similar to murine virus of Europe and America ; no work so far has been done on rat fleas but it is probable that they carry the virus from rat to man.

Crossed immunity experiments were carried out with the viruses of the three types and gave the following results :—

1. Guineapigs immunized to the virus of tick bite fever are immune to the virus of epidemic typhus and sporadic typhus.
2. Guineapigs immunized to the virus of the local sporadic typhus are immune to the virus of tick bite fever but are *not* immune to the virus of epidemic typhus.
3. Guineapigs immune to the South African epidemic typhus virus are immune to the viruses of tick bite fever and sporadic typhus.

Tick bite fever closely resembles boutonneuse fever but differs in that it is carried by a field tick and not by a parasite of domestic animals (*R. sanguineus*). It is a much milder disease, yet the virus in the blood of patients is readily conveyed to animals, whereas the virus of boutonneuse fever is only conveyed with difficulty. A comparative table is given at the end of the paper. *D. H.*

HENNESSEY (R. S. F.). **Typhus Fever in Uganda.**—*East African Med. Jl.* 1934. May. Vol. 11. No. 2. pp. 42–60. With 1 chart.

This disease was first noted in Kabale in the year 1932 ; the sera of patients gave a positive Weil-Felix reaction. Eighty-three cases in all have so far been reported ; in one instance 36 out of 45 females in one dormitory at a mission station developed the disease. The mortality was nil. Investigation showed that the people were heavily infested with lice both of the head and body.

The author made a careful estimation of the Weil-Felix reaction using O variants of X19 and XK. Of 57 cases 28 gave a positive reaction with X19 and all were negative with XK ; the interesting point is that although these were apparently cases of louse-borne typhus no serum gave a higher reading than 1/1,600.

Blood was taken from some of the patients and injected into guineapigs ; these reacted with fever and also had some swelling of the scrotum. This was not marked externally but on examination gelatinous exudation was found and Rickettsia were demonstrated in the

fluid. Lice, collected from patients and also from people who had recently recovered from the fever, when emulsified and injected into guineapigs produced fever and infection of the scrotum ; the brains of these guineapigs showed only slight evidence of the presence of the virus, more marked, however, than is usually the case with the virus of endemic typhus but less than one would expect to be produced by the virus of true typhus. *D. H.*

RAGIOT (Ch.) & DELBOVE (P.). Typhus endémique de Cochinchine. [**Endemic Typhus of Cochin-China : Pulmonary Symptoms.**]—*Bull. Soc. Méd.—Chirurg. Indochine.* 1934. Apr. Vol. 12. No. 4. pp. 449–453. With 1 chart.

——, DELBOVE (P.) & TRAN-VAN-TU. Typhus endémique probable de Cochinchine à Tan-an. Relations avec "l'épidémie de pneumococcies de l'Ouest Cochinchinois."—*Ibid.* pp. 454–459.

A clinical description of cases of endemic typhus under the care of the authors.

These cases all gave a positive Weil-Felix reaction and the symptoms described are typical of the disease as met with in other parts of the world, except that in a number of cases very definite pulmonary symptoms were noted, ranging from slight bronchitis to broncho-pneumonia ; many of these were fatal. These pulmonary symptoms masked the true nature of the disease which was, however, revealed by the rash and the positive Weil-Felix reaction. Louse-borne typhus is unknown in Cochin China. *D. H.*

MESNARD (J.) & DELBOVE (P.). Existence, dans l'encéphale des rats de Saïgon, d'un virus rappelant le virus du typhus exanthématique. [**A Typhus-like Virus in the Brains of Rats of Saigon.**]—*Bull. Acad. Méd.* 1934. July 24. 98th Year. 3rd Ser. Vol. 112. No. 28. pp. 168–171.

In October 1933, 86 rats which were caught in Saigon, Cochin China, were killed and emulsions of the brains inoculated into guineapigs. Three strains of virus were isolated ; this virus gave in guineapigs the picture of a rat typhus virus, *i.e.*, fever, scrotal reaction and few brain lesions. The authors also noted that in infected guineapigs a rash appeared on the skin of the scrotum in male guineapigs and on the vulva of the female ; this rash they consider to be diagnostic. Unfortunately owing to difficulty of transport of infected animals it was not possible to carry out crossed immunity experiments. Cases of endemic typhus fever had already been noted in the native hospital in the city of Saigon. *D. H.*

MOREIRA (João Affonso) & DE MAGALHÃES (Octavio). Typhus exantematico em Minas Gerais. [**Typhus Fever in Minas Geraes.**]—*Mem. Inst. Oswaldo Cruz.* 1934. Vol. 28. No. 2. pp. 225–234. With 7 graphs & 2 plates.

In a previous note the authors had stated that inoculation of 283 guineapigs with the virus of Minas Geraes typhus, killed 69·2 per cent. of the animals.

Since then with increase in the number inoculated, the fatality rate has considerably increased, so that amongst 692 animals inoculated, the rate was 90·6 per cent., which according to PARKER is the same as

that of guineapigs inoculated with the virus of Rocky Mountain spotted fever.

In the present paper the authors record a series of experiments on guineapigs bearing on the problem of crossed immunity in relation to the viruses of Minas Geraes, São Paulo typhus and Rocky Mountain spotted fever.

Their conclusions are as follows :—

1. Rocky Mountain spotted fever vaccine does not protect guineapigs against the virus of Minas Geraes typhus.

2. Guineapigs which have recovered from Minas Geraes typhus may be killed by inoculation with São Paulo typhus, or Rocky Mountain spotted fever.

3. Minas Geraes convalescent serum protects guineapigs when it is injected immediately after inoculation with the virus of São Paulo typhus, Rocky Mountain spotted fever, or Minas Geraes typhus.

J. D. Rolleston.

EPSTEIN (H.) & SILVERS (I. L.). Ueber den sogenannten endemischen Flecktyphus der Moskauer Ratten. [**The So-called Endemic Typhus of Moscow Rats.**]—*Giorn. d. Batter. e Immunol.* 1934. Apr. Vol. 12. No. 4. pp. 593–612. With 2 figs. English summary (5 lines).

One hundred rats captured in Moscow were killed and emulsions from the brains of groups of six rats were inoculated into guineapigs ; 32 per cent. of these developed fever.

The fever in the guineapigs is described in detail as regards incubation period, duration of fever, scrotal reaction and mortality. Rickettsia were demonstrated in the tunica.

Of 80 rats examined 37 per cent. gave a positive Weil-Felix reaction and 80 per cent. of the positive results in guineapigs were obtained from the rats with positive Weil-Felix reaction. It was also found that in guineapigs inoculated with the virus of epidemic (historical) typhus the Weil-Felix reaction was never positive, whereas in guineapigs inoculated with the rat typhus virus the Weil-Felix reaction which was negative in the normal animals became positive although not in any higher dilution of the serum than 1/40. As regards crossed immunity experiments with the various strains of virus it was found (1) that the strain of rat virus isolated by the authors protected one-half of the inoculated guineapigs against another Moscow strain ; (2) that inoculation of guineapigs with the human typhus virus protected 30 per cent. of the guineapigs against the rat strain ; (3) the rat strain of typhus virus did not protect guineapigs against the human typhus virus.

An interesting point was that guineapigs infected by means of an emulsion of fleas fed on infected rats were found to be protected against the local strain of human typhus virus. *D. H.*

NICOLLE (Charles) & SPARROW (Hélène). Etude d'un virus typhique murin, isolé des rats du port de Tunis. [**Study of a Typhus Virus isolated from Rats in the Port of Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1934. Aug. Vol. 23. No. 3. pp. 247–303. With 9 charts. [Summary appears also in *Bulletin of Hygiene.*]

A Weil-Felix reaction carried out on the sera of 880 rats in the Port of Tunis was positive in a titre of 1/80 or over in 4·4 per cent., and in a titre of 1/40 or over in 9·9 per cent.

Weigl's method of using for agglutination a *Rickettsia* suspension from the intestines of lice, instead of *Proteus X19*, was found to be very satisfactory. The test seemed to be slightly more sensitive, and the titre against a Mexican (rat) virus was sometimes rather higher than against the classical European virus, thus giving a clue to the probable nature of the infecting agent.

Two strains of virus were isolated from rats and studied carefully. They were similar to murine viruses described in other parts of the world. They caused fever and orchitis in guineapigs. In rats they gave rise to a fever of short duration, and led in about one-third of these animals to the development of a positive Weil-Felix reaction. Their pathogenicity to man appeared to be relatively feeble, and persons who contracted infection in the laboratory suffered only mild attacks of typhus. *G. S. Wilson.*

SAVOOR (Sadashivarao R.) & VELASCO (Roberto). **The Survival of Varieties of Typhus Virus in Mouse Passage, with Particular Reference to the Virus of Brill's Disease.**—*Jl. Experim. Med.* 1934. Sept. 1. Vol. 60. No. 3. pp. 317–322. With 1 chart.

Three different viruses were employed in this research :—

1. A Mexican murine virus.
2. A true typhus virus obtained from Europe.
3. A virus obtained from a case of Brill's disease in Boston, U.S.A.

Virus No. 1 gave the usual reactions of a murine or endemic typhus virus in guineapigs and rats. Nos. 2 and 3 gave the reactions of the human or old world historic virus in the same animals. The 3 viruses were tested by inoculation into mice and the results of the experiments show that the European typhus virus cannot be maintained for more than two generations in mice by brain peritoneum passage, whereas the murine Mexican variety can be carried on by this method in mice for at least eleven generations. The virus of Brill's disease from three different sources behaved like the European virus, an observation which strengthens the opinion expressed by ZINSSER that Brill's disease represents an imported strain of the classical European infection. [If it is generally accepted that Brill's disease as it occurs in New York and Boston is due to the European virus (historic or human type) and, as suggested by ZINSSER, is not carried by the rat flea or the louse, it would be necessary to distinguish between Brill's disease and endemic typhus, the latter term being reserved for the typhus-like disease which occurs in America, in Mexico, in Europe and in other parts of the world and is caused by the murine virus and is carried from the rat to man by the rat flea.] *D. H.*

MONTEIRO (J. Lemos). Etude comparative entre le " typhus exanthématique de Sao Paulo " (rickettsiose néotropique) et le typhus exanthématique Chili (rickettsiose épidémique) par l'épreuve de protection avec des sérums de convalescents. [**Comparative Study of the Virus of São Paulo Typhus (R.M.F.) and Epidemic Typhus of Chile.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1131–1132.

Five sera from cases of epidemic typhus in Chile were tested for action on the virus of São Paulo fever. They were mixed with varying quantities of virus and injected into guineapigs ; no protective action whatever was noted.

This negative result shows that the typhus of Chile is a true typhus and not allied to Rocky Mountain fever. *D. H.*

LÉPINE (P.). Neurotropisme et adaptation du virus murin du typhus exanthématique. [**Neurotropism and the Adaptation of the Murine Virus of Typhus.**]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 536–540.

The author has noted in his investigation of rat typhus viruses in the Mediterranean area that these vary in virulence for guineapigs and rats. Strains of virus which have at first produced fever and marked scrotal reaction and no brain lesions, may, when they lose virulence, cease to produce orchitis but produce marked brain lesions, *i.e.*, they become neurotropic. Strains isolated from wild rats during non-epidemic periods are of this latter type, they resemble the true or historic typhus virus in their action on experimental animals. During epidemic periods the virus isolated from rats is virulent for guineapigs and produces orchitis.

The author suggests that in non-epidemic periods the virus shelters in the brains of rats. He also suggests that a like change in the rat virus may take place when it is taken up by the louse and passed from man to man, *i.e.*, the endemic virus is transformed into the epidemic, the " rat " virus into the " historic." *D. H.*

RONSE (Marguerite). Adaptation du virus du typhus murin aux mulots et aux pigeons. [**Adaptation of the Virus of Rat Typhus to Field Mice and Pigeons.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 19. pp. 358–360.

Field mice were inoculated with the virus and later guineapigs were infected from them. Pigeons were also shown to be susceptible.

D. H.

DYER (R. E.). **Endemic Typhus Fever. Susceptibility of Woodchucks, House Mice, Meadow Mice, and White-footed Mice.**—*Public Health Rep.* 1934. June 22. Vol. 49. No. 25 pp. 723–724.

Woodchucks (marmots), house mice, meadow mice and white footed mice were all found to be susceptible to the virus of endemic typhus fever. *D. H.*

VARELA (Gerardo) & GAY (M. A. Parada). Production d'orchite au moyen de la souche tunisienne de typhus épidémique. [**Orchitis produced by a Tunis Strain of Epidemic Typhus.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 23. pp. 731–732.

Professor NICOLLE had supplied the authors in Mexico with a strain of typhus virus (old world) from Tunis. By employing a special method, inoculation of the virus intraperitoneally into rats followed by daily inoculations of fresh guineapig blood and then inoculation of the washings of the peritoneum of these rats into guineapigs, the virus after 12 passages lost its original characters and gave the reactions of a rat typhus virus, *i.e.*, scrotal reaction in guineapigs and fever in rats. This virus retained these characters for a further 12 passages without inoculations of fresh blood.

The authors claim that they have demonstrated that the historic typhus virus can be changed into a rat typhus virus, the non-orchitic into the orchitic. *D. H.*

JELIN (W.), LINETZKAJA (A.) & GROSSMANN (J). Die Bedeutung des retikuloendothelialen Systems bei Fleckfieber. [**The Rôle of the Reticulo-Endothelial System in Typhus Fever.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. May. Vol. 38. No. 5. pp. 202–206. With 6 figs.

The authors refer to previous work on the same lines in bacterial and protozoal diseases; they find that if the spleen is removed and the remainder of the reticulo-endothelial system blocked by means of India ink rabbits develop a marked febrile reaction when inoculated with typhus virus and also lesions are found in the brain and internal organs; whereas only inapparent infection occurs in rabbits not so treated. Guineapigs treated in the same way develop a much more severe illness than is shown in untreated animals. The R.E.S. therefore plays a prominent part in the mechanism of infection and immunity in typhus fever. *D. H.*

RONSE (Marguerite). Infection exanthématique par voie digestive. [**Typhus contracted by the Digestive Tract.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 19. pp. 360–363.

The author repeated the work of NICOLLE with typhus virus and has shown that rats, voles, dwarf mice, rabbits and hedgehogs can be infected by the digestive route.

Bread was soaked in emulsion of the brain of infected guineapigs and the animals were fed on this. Infection was proved by injection of the brain of the experimental animals into normal guineapigs which reacted with fever and swelling of the scrotum. No fever was noted in the rats, which had an "inapparent infection." *D. H.*

EPSTEIN (H.), TUREWITSCH (E. I.) & EXEMPLARSKAJA (E. W.). Zur Mikroskopie des Flecktyphus. [**Microscopic Appearances in Typhus.**]—*Giorn. Batter. e Immunol.* 1934. Apr. Vol. 12. No. 4. pp. 659–667. English summary (2 lines).

Demonstration of Rickettsia bodies in the cells of the blood of typhus patients.

By special differential staining methods and examination by means of dark ground illumination the authors claim that they can demonstrate Rickettsia bodies in monocytes in the blood of typhus patients and that they can distinguish these from normal granules in the cells; they consider that these bodies are identical with Rickettsia bodies seen in the endothelial cells of the tunica of infected guineapigs and in the cells of the intestines of lice. *D. H.*

LÉPINE (P.) & BILFINGER (F.). *Rickettsia* et typhus exanthématique. [**Rickettsia and Typhus.**]—*Bull. Soc. Path. Exot.* 1934. Apr. 11. Vol. 27. No. 4. pp. 298–304.

The authors have repeated their investigations on the filterability of the virus of typhus. They find that this virus does *not* pass through

filter candle L3, contrary to what has been recently stated by PANAYOTATOU [this *Bulletin*, Vol. 31, p. 245] ; the same investigator has also stated that Rickettsia can be readily demonstrated in smears from the spleen of infected guineapigs ; this is contrary to the experience of the authors who found that although emulsions of spleen from infected guineapigs were highly infective no Rickettsia could be found in smears made from the spleen, an interesting observation and one which points to an ultra microscopical form of the Rickettsia. In rats dead of typhus infection numerous Rickettsia, readily stained, appear in the peritoneal cavity ; these bodies rapidly disappear and cease to take the stain yet the fluid retains its virulence. In the spermophile an animal readily infected and the tissues of which are highly infective, Rickettsia are rarely seen in the glands or tissues; also the tissues (brain and spleen) of guineapigs are infective before Rickettsia appear in the peritoneum or scrotum. In spite of these findings the authors are convinced that Rickettsia and the virus of typhus are one and the same but there is much yet to be explained. Certain cells are found in the spleen of infected animals which show numerous granular inclusions which stain in the manner of Rickettsia but are *not* included Rickettsia ; these cells have not been noted in control animals. It is suggested that there are two forms of Rickettsia, the ordinary bacillary form and the granular intracellular form. *D. H.*

ZIA (Samuel). **The Cultivation of Mexican and European Typhus Rickettsiae in the Chorio-Allantoic Membrane of the Chick Embryo.** —*Amer. Jl. Path.* 1934. Mar. Vol. 10. No. 2. pp. 211–218. With 3 figs. on 1 plate.

Emulsion of tunica from guineapigs infected with typhus virus was dropped on to the exposed membrane of eggs containing live chick embryos, these were incubated and a reaction resulted ; material from the thickened membrane produced infection when injected into guineapigs ; also Rickettsia could be demonstrated in smears made from the thickened membranes. Similar results were obtained with Mexican and European typhus virus. Some figures are given showing the histological changes produced by the virus in the membranes of the chick embryo. *D. H.*

i. NISHIBE (Masujiro) & MIYAZAWA (Masaei). **On the Growth Inhibiting Action of Immune Tissues and Plasma on Rickettsia Orientalis. A Study with Tissue Cultures.**—*Trans. Soc. Path. Japon.* 1933. Vol. 23. pp. 747–750.

ii. YOSHIDA (S.) & UEDA (M.). **Tissue Culture of the So-called Manchurian Typhus Fever Virus. Part I. The Relation of Virulence and Rickettsia according to the Kinds of Cultured Tissues.**—*Ibid.* pp. 753–754.

i. The cultures were inoculated with rabbit testicle cells containing *R. orientalis* and (1) normal tissue, *i.e.*, rabbit testicle, (2) testicle of immune rabbits, (3) immune plasma.

It was found that the multiplication of the Rickettsia was marked in the tubes to which normal tissue had been added, much less in the tubes with immune plasma and hardly any in the tubes to which immune tissue had been added

ii. The medium employed was heparin plasma with infected tissue cells and normal tissue. Omentum, lung, spleen, marrow, etc., were employed as the normal tissue and it was found that omentum gave much the best results ; that is, the multiplication of Rickettsia was greatest in the tubes with omental cells. *D. H.*

KLIGLER (I. J.) & ASCHNER (M.). **Immunization of Guinea Pigs with Formalized Cultures of European Strain of Typhus Rickettsia.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Apr. Vol. 31. No. 7. pp. 808–809.

The authors have recently shown that it is possible to cultivate Rickettsia *in vitro*. Guineapigs have now been successfully immunized with formolized suspension of fresh virulent culture as well as with older cultures which were no longer infective for guineapigs. Ten days after the last injection of the vaccine the guineapigs received a test dose of 80 infective doses of brain virus and 16 days later 800 doses were given without any reaction ; all non-vaccinated controls reacted. *D. H.*

BLANC (Georges), NOURY (M.), BALTAZARD (M.), BRUNEAU (J.) & BARNEOUD (J.). Nouvelles expériences de vaccination humaine contre le typhus exanthématique par vaccin vivant. Infection et immunité. [**Vaccination of Man against Typhus with Living Vaccine.**]—*Bull. Acad. Méd.* 1934. May 1. 98th Year. 3rd Ser. Vol. 111. No. 16. pp. 582–592. With 6 figs.

This living vaccine is prepared by emulsifying material from the spleen and tunica of guineapigs infected with a mild strain of endemic typhus ; it has been proved that passage of this mild virus through a series of animals does not increase the virulence. The emulsion of the virus in normal saline is treated by contact with ox bile for two hours ; the vaccine is diluted 1,000 times and inoculated in doses of 2 cc.

The authors are of opinion that it is not possible to vaccinate against typhus without causing an infection ; inoculation with the living bile-treated vaccine causes an inapparent infection with subsequent immunity. 1,000 people can be vaccinated with the material obtained from an infected guineapig. *D. H.*

SUZUKI (K.). Untersuchung ueber Rickettsia-Infektion (sogenanntes Rattenfleckfieber-Virus) und Weil-Felix-Reaktion bei Ratten in Hamburg. [**Research on Rickettsia Infection (So-called Rat Typhus Virus) and the Weil-Felix Reaction in Rats in Hamburg.**]—*Taiwan-Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. Apr. Vol. 33. No. 4 (349). [In Japanese. German summary pp. 58–76. With 25 figs. [21 refs.]]

The author refers fully to recent work on the same lines in America and in Europe. The sera of ten rats (1 ship rat and 9 decumanus) were tested ; 1 agglutinated OX19 in a dilution of 1 in 50 and 4 agglutinated X19 (*sic*) in 1–200. Emulsions of the brains of the rats were injected intraperitoneally into male guineapigs ; in 3 instances positive results were obtained, *i.e.*, fever and orchitis ; these strains were passaged in guineapigs and numerous temperature charts are given in the text along with photographs of the scrotal condition showing rickettsia in the cells of the tunica. These rickettsia were not observed in the guineapigs directly inoculated from the rats but appeared about the

3rd or 4th passage. It is also stated that a positive Weil-Felix reaction up to a dilution of 1/200 was obtained in the infected guineapigs. [See papers by DURAND.] *D. H.*

LAIGRET (Jean) & DURAND (Roger). Sur les caractères antigéniques d'une souche tunisienne de *B. proteus*. [**Antigenic Characters of a Tunis Strain of Proteus.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 17. pp. 119–120.

This strain of Proteus (S24) was isolated from the blood of a mouse which had died of an infection with the bacillus. The O form of S24 was readily agglutinated by the serum of cases of typhus fever to the same titre as OX19 ; S24 is apparently identical with that classical strain except that when OS24 is inoculated into rabbits their serum agglutinates S24 and X19 and also XK ; whereas X19 does not produce agglutinins for XK. S24 resembles the strain of Proteus recently isolated in Lima and associated with the São Paulo type of Rocky Mountain fever which also produces agglutinins for XK when inoculated into rabbits. *D. H.*

DURAND (Roger). Réaction de Weil et Félix positive chez le cobaye typhique. [**Positive Weil-Felix Reaction in Guineapigs with Typhus.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 17. pp. 118–119.

In man and in rabbits a positive Weil-Felix reaction has been noted but so far although guineapigs react to the virus the serum does not give a positive reaction.

The authors have, however, shown that if the virus (emulsion of brain of infected guineapig) is inoculated directly into the heart of the guineapig a positive reaction is obtained although only in low titre 1/50. If the animal is at the same time inoculated intraperitoneally with starch (tapioca) a slightly higher titre can be obtained, 1/100.

D. H.

DURAND (Roger). Agglutination du proteus dans le typhus exanthématique du cobaye. [**Proteus Agglutination in Typhus of Guineapigs.**]—*Arch. Inst. Pasteur de Tunis.* 1934. July. Vol. 23. No. 2. pp. 155–237. With 1 chart. [71 refs.]

This is a record of a most careful research on the question of the Weil-Felix reaction in guineapigs. The first part of the paper deals with the Weil-Felix reaction in general and the necessity of utilizing only O emulsions of Proteus.

Practically all cases of true typhus give a positive Weil-Felix reaction as do also monkeys, rabbits and rats when inoculated with the virus or in the case of the last when infected in nature ; but although guineapigs are the animals most commonly employed and most useful in experimental work on typhus their serum does not agglutinate Proteus X19 or any of the other strains of Proteus utilized in typhus work ; yet when the virus of typhus is inoculated into guineapigs they develop a marked fever which is followed by immunity but not by production of agglutinins for Proteus. Also, if the animals are inoculated with cultures of Proteus they develop agglutinins for that bacillus just as readily as do rabbits or rats. It was noted that if guineapigs which have recovered from an attack of experimental typhus are inoculated with living emulsions of Proteus they produce agglutinins for the homologous

bacillus but not to such a high titre as do guineapigs which have not previously been infected with typhus virus; on the other hand in guineapigs which have been inoculated with Proteus and are subsequently infected with typhus virus the agglutinins for Proteus are in no way affected.

The sera of typhus guineapigs was also tested for other reactions besides agglutination but neither flocculation, precipitation nor complement fixation was detected; neither could any agglutinins for *Br. abortus* or allied bacteria be found.

It might be thought that there was an inhibitory substance for typhus agglutinins in the sera of guineapigs but the authors state that this is not the case; several reasons for this opinion are given :—

1. Proteus X19 treated by the serum of guineapigs retains its agglutinability by other typhus sera.

2. Guineapig serum does not remove or reduce the agglutinins from other typhus sera, man or rabbit. In addition to the serum of typhus guineapigs the whole blood, plasma and spleen pulp also give negative results when tested for the Weil-Felix reaction. Different methods of inoculating the virus into the animals were tried to ascertain whether a positive Weil-Felix reaction could be obtained; intracerebral and intraperitoneal inoculation of the virus were both followed by negative results but when the virus was inoculated directly into the heart there was evidence of some slight but quite distinct agglutination of Proteus X19 after the fever but not in higher titre than 1/25.

Finally after trying out various methods without success it was found that if the animals are cholesterized so that the cholesterol content of the blood is high and if powdered tapioca is introduced into the peritoneum and the virus is then inoculated intracardially a positive Weil-Felix reaction is produced in the sera of the guineapigs. *D. H.*

i. DE ASSIS (Arlindo). Estudos sobre "Proteus XL." I. Analyse agglutinante. [**Agglutination Reactions of Proteus XL.**]—*Brasil-Medico.* 1934. Apr. 14. Vol. 48. No. 15. pp. 253–256. English summary.

ii. ——. II. Agglutinabilidade em sôros humanos.—*Ibid.* No. 16. pp. 274–275. English summary.

i. The sera of rabbits immunized with OXL (Lima São Paulo strain) develop agglutinins for OXL and OX19; indeed OX19 may be agglutinated in higher titre than OXL. Group agglutinins for OX2 and O Proteus Americanus (OXA) were also noted but no agglutinins for OXK were produced.

ii. From agglutination tests on 270 human sera taken from cases of fever such as typhoid, tubercle, malaria, and syphilis, slight non-specific agglutination of the O variant of Proteus OXL (strain of Lima, São Paulo) was noted. This non-specific agglutination of OXL was quite distinct from the true Weil-Felix reaction. In this respect OXL and OX19 differ from OXK. *D. H.*

DINGER (J. E.). Infecties met proteus van het type Kingsbury. [**Infections with Proteus, Type Kingsbury.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. May 22. Vol. 74. No. 11. pp. 661–672. English summary.

Two cases of infection of the bladder are described in which cultures of proteus organisms were obtained. These strains were proved to be

culturally identical and serologically similar to the Kingsbury strain XK. One strain showed relationship both with the O and H antigen ; the other differed in the H antigen and was only partially related in the O. In both cases the patients' sera contained agglutinins for OXK. In neither was there any symptom of typhus fever. *D. H.*

DE ASSIS (Arlindo). Estudos sobre *Proteus americanus*, Pacheco (Proteus XA). I. Agglutinabilidade da variante OXA nas rickettsioses humanas. [**Studies on** *P. americanus* (**XA**).]—*Brasil-Medico.* 1934. July 14. Vol. 48. No. 28. pp. 552–554. English summary.

The sera of 6 patients suffering from typhus fever of São Paulo and of 3 convalescents from true or epidemic typhus of the Argentine were tested for agglutinins against emulsions of *Proteus americanus* OXA and also OX19, OX2, OXL and OXK. The results reveal a close relationship between OXA and OXK the Kingsbury strain. *D. H.*

DE ASSIS (Arlindo). Estudo sobre *Proteus americanus* Pacheco (Proteus XA). II. Estudo geral do agglutinogenio flagellar (HO). [*Proteus americanus* (**Proteus XA**) **: its H Agglutinins.**]—*Brasil-Medico.* 1934. Aug. 11. Vol. 48. No. 32. pp. 635–639. English summary.

The author cultivated the organism for six months on agar and found that this species exhibited a tendency to revert to the O type of agglutinin. The sera of rabbits immunized with living cultures proved to contain also group agglutinins for HXK, and vice versa, sera of animals immunized with HXK cultures contained group agglutinins for Proteus XA. Absorption tests showed that the flagellar agglutinins for each were quite distinct, those of Proteus XA " seemed definitely more complex." Proteus XA sera did not agglutinate flagella variants of Proteus X19, X2 and XL. A so-called *Pr. mirabilis* N.2 strain had flagellar agglutinogens identical with those of *Pr. americanus*, and this (*Pr. mirabilis* N.2) has been isolated from the nasal discharges of a man who had never suffered from any disease resembling typhus, and *Pr. americanus* has also been isolated from the blood of a man with an infection apparently having no connexion with any known Rickettsia disease. *H. H. S.*

KYU (U. F.). **Clinical Observations on the So-called Two-Weeks Fever (or Sporadic Eruptive Fever) in Formosa.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. May. Vol. 33. No. 5 (350). [In Japanese. pp. 832–852. With 5 charts [25 refs.] English summary pp. 88–89.]

KOJIMA (T.), YAMANAKA (S.) & KYU (U. F.). **Studies on the So-called Two-Weeks Fever (or Sporadic Eruptive Fever) in Formosa.**—*Ibid.* [In Japanese pp. 853–872. With 5 figs. (4 coloured) on 1 plate. [21 refs.] English summary pp. 89–96.]

For many years a disease known locally as " two weeks fever " has been known to occur in Formosa. It is a typhus-like disease of mild form and the serum of patients gives a positive Weil-Felix reaction. The authors have isolated a virus from cases which in its effects on

guineapigs resembles the virus of rat typhus ; Rickettsia were readily found in the lesions in the scrotum. It has also been possible to test the local virus against a virus of true typhus and crossed immunity has been demonstrated.

A similar virus has also been isolated from rat fleas caught on rats on premises where cases of the two weeks fever had occurred. *D. H.*

CUMMING (James G.). **Rocky Mountain Spotted Fever invades the East.**—*Southern Med. Jl.* 1934. Sept. Vol. 27. No. 9. pp. 783–788. With 5 figs. (1 map).

MILAM (D. F.). **Rocky Mountain Spotted Fever in North Carolina.**—*Ibid.* pp. 788–792.

These two papers deal with Rocky Mountain fever as it occurs in the Central and Eastern sections of the United States, especially in N. and S. Carolina. A full clinical description of the disease is given with excellent photographs showing the appearance of the rash.

As regards prevention it is pointed out that although destruction of small rodents and keeping of fowls around homesteads may aid in the reduction of ticks, yet the best method is by means of the vaccine prepared from infected ticks.

The tick which causes the disease in man in the Eastern States is the common dog tick of America, *Dermacentor variabilis*. This tick in the larval form feeds on small rodents, squirrels, field mice, rabbits, etc., and in the adult form on dogs and occasionally on man. A warning is given of the danger involved in removing ticks from dogs and crushing them in the fingers since infection has been carried in this way in Rocky Mountain fever and boutonneuse fever. *D. H.*

MILAM (D. F.). **Rocky Mountain Spotted Fever in North Carolina.**—Reprinted from *Southern Med. & Surgery.* 1933. Sept. Vol. 95. No. 9. 4 pp. & 1934. Feb. Vol. 96. No. 2. 2 pp.

In 1933 18 cases of Rocky Mountain fever were reported in North Carolina ; previously only one case had been recognized, probably cases had been diagnosed as " typhus fever."

In the present series it was noted that the rash covered the entire body including the palms and soles.

Source of infection.—Small wild rodents are the reservoir of the virus and ticks as larvae and nymphs feed on these and become infected ; the adult ticks, still infective, feed for preference on the dog, the horse and man ; these adult ticks lay eggs in which the infection is maintained. The tick season is the fever season.

A table is shown giving the chief differential points between Rocky Mountain fever and endemic typhus.

Rocky Mountain Fever.	*Endemic Typhus.*
Epidemiology.	
1. Rural	Urban.
2. History of tick bite in 75 per cent. of cases	Premises infested with rats.
3. More children attacked.	Adults, middle age.
4. One or two cases in same family.	Sporadic.

	Rocky Mountain Fever.	*Endemic Typhus.*
	Clinical.	
1.	Onset sudden.	Onset sudden.
2.	Fever up to 107° lasts about 3 weeks, lysis.	Fever lower, crisis end of 2nd week.
3.	Rash first on wrists and ankles then general, including palms and soles.	First on trunk, flexor surface of limbs, rarely on face or palms and soles.
4.	Pulse rate higher.	Pulse rate lower.
5.	Fatality 25 per cent. in eastern type	Under 5 per cent.

Thirty-seven cases noted in 1934 varied from very mild to severe and fatal. Inoculation of blood taken from one of these mild cases gave a positive reaction in a guineapig.

The local medical men are of opinion that this is no new disease in the district but that similar cases have been met with for 20 years and diagnosed as typhus. There is, however, probably an increase in the number of cases as well as in that of endemic typhus. *D. H.*

GIMBERT, ANDREOLI, HOUSSIAUX & FOUREST. Fièvre boutonneuse grave. Début conjonctival. Forme délirante ataxodynamique. Abcès de fixation. Sérum de convalescent. Guérison. [**Severe Form of Boutonneuse Fever of Conjunctival Onset.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1934. May 14. 3rd Ser. 50th Year. No. 15. pp. 614–615.

A very severe case of boutonneuse fever, the initial lesion being in the conjunctiva. The nervous symptoms were particularly alarming. Two doses of convalescent serum were given, followed by recovery. *D. H.*

RAYBAUD (A.). Comment l'appellerons-nous : fièvre boutonneuse, exanthématique, dothiendermie ? [**Nomenclature of Marseilles Fever.**]—*Marseille-Méd.* 1934. June 5. Vol. 71. No. 16. pp. 693–695.

In an article in the *Lyon-Médical* of May 1934, CHALIER, PLAUCHU & BADINAND have proposed that the disease at one time known as exanthematous fever of Marseilles should now be called " dothiendermie aiguë." Raybaud points out that after a full discussion by a Commission of the International Congress of Hygiene of the Mediterranean it was decided that this disease should be known as " boutonneuse " fever, the name originally given to it by CONOR and BRUCH in Africa in 1910. Raybaud therefore deprecates the proposal to give still another name, one which, as he points out, has no advantages other than its derivation from the Greek. *D. H.*

PIJPER (Adrianus). **Tick-Bite Fever. A Clinical Lecture.**—*South African Med. Jl.* 1934. Aug. 11. Vol. 8. No. 15. pp. 551–556.

This paper is a clinical lecture on and demonstration of a typical case of " tick bite fever." The author prefers to retain the name of " tick bite fever " originally given to the disease by NUTTALL, although he agrees that it may give rise to confusion with " tick fever," *i.e.*, relapsing fever carried by ticks.

The present case showed a very definite primary sore similar to the " tache noire " of boutonneuse fever, which disease tick bite fever resembles in many respects although they are not identical.

The disease in South Africa is a mild one with fever lasting ten days and severe headache and a rash of maculae or maculopapules ; but it may occur in " forme fruste " with primary sore and inflamed lymphatics without fever. The Weil-Felix reaction is positive but may only appear after the fever is over. *D. H.*

LENTJES (L. J. M.). Een geval van tropical (" shop ") typhus met primair affect. [**Tropical (" Shop ") Typhus with a Primary Lesion.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. July 3. Vol. 74. No. 14. pp. 876–879.

" Scrub " typhus and mite fever give a serum reaction of agglutination with the Kingsbury strain of Proteus, while " shop " typhus serum agglutinates Proteus OX_{19}. Again, mite fever exhibits a primary lesion while " scrub " typhus does not, nor has any such primary lesion been described in " shop " typhus. The interest of the present case lies in the fact that it was a typical case of typhus fever, the serum agglutinated Proteus OX_{19} and was negative to the Kingsbury strain, and there was a well marked primary lesion. The conclusion is therefore reached that " shop " typhus may have a primary lesion as illustrated by this unique case, but that in all probability it is usually evanescent.

On the day that the patient fell ill he noticed a small round swelling on the scrotum which was oozing a little and was itchy and burning. On admission to hospital there was found an ulcer, 7 by 5 mm., with a sharp pale margin, small surrounding red halo and dirty yellow-grey base on the middle of the scrotum just under the root of the penis. There was no induration and the regional lymph nodes were moderately swollen. This was the primary lesion. No history was forthcoming of its origin. Trauma and venereal infection were excluded.

W. F. Harvey.

HAYASHI (Naosuke), MATSUOKA (Shigeji), KATO (Taro) & OKAMOTO (Niichizo). **Studies on Tsutsugamushi Disease. Report for 1932.** —*Trans. Soc. Path. Japon.* 1933. Vol. 23. pp. 735–738. With 1 coloured fig.

The morphology of R. tsutsugamushi.—Exceedingly minute forms have been noted 0·2 to 0·25 μ in diameter. In the opinion of the author these are the " initial forms " ; they increase in size and finally divide.

Etiology.—R. tsutsugamushi has been demonstrated in the spleens of wild rats caught in areas where the disease is epidemic. The same condition has been noted in the case of guineapigs placed in infected areas of the country and bitten by mites.

Prevention.—Vaccination by means of injection of infected tissues has been employed. *D. H.*

KŌ (Tōuu). Klinische Beobachtungen in 100 Fällen von Tsutsugamushi-Krankheit. [**Clinical Observations on 100 Cases of Tsutsugamushi Disease.**]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1934. Apr. Vol. 33. No. 4 (349). [In Japanese. German summary p. 51.]

During the 20 years 1911–1931 the author has had under his care 100 cases of this disease.

The cases occurred every year in the summer season among field workers and their families, the ages of the patients varying from 1 year to 76 years. The fatality rate was about 20 per cent. *D. H.*

CHIANESE (Raffaele). Due casi di febbre esantematica estiva del Litorale Mediterraneo.—*Terapia.* 1934. Apr. Vol. 24. No. 178. pp. 109–116. [27 refs.]

DOPFF (C. Soler) & CONFORTO (A. Valls). Observaciones locales de fiebre exantemática mediterránea.—*Rev. Méd. Barcelona.* 1934. Oct. Year 11. Vol. 22. No. 130. pp. 289–294. With 2 charts & 2 figs. on 1 coloured plate.

FUNK (William H.). A Case of Endemic Typhus or Brill's Disease in the Philippine Islands.—*U.S. Nav. Med. Bull.* 1934. Oct. Vol. 32. No. 4. pp. 517–518.

DENGUE AND SANDFLY FEVER.

HOFFMANN (J. M.), MERTENS (W. K.) & SNIJDERS (E. P.). **The Transport of the Javanese "Endemic Dengue" to Amsterdam.**—Reprinted from *Proc. Acad. Sci. Amst.* 1932. Vol. 35. No. 6. pp. 909–910.

Blood was taken from dengue patients in Java on the second day of the disease. The serum was dried, placed in a refrigerator and brought to Amsterdam. The dried serum was redissolved and inoculated into volunteers 285 days after it had been taken in Java; one of these volunteers developed a typical attack of dengue and the disease was passed to other volunteers. It is now proposed to compare the virus from Java with that already obtained from Sumatra [see this *Bulletin*, Vol. 28, p. 619]. *D. Harvey.*

JESIORAN (R.). La dengue dans le bassin méditerranéen. [**Dengue in the Mediterranean Basin.**] [Thesis: University of Algiers.]—116 pp. [16 pages of refs.] 1933.

In this comprehensive and detailed review of the subject of dengue in Southern Europe over 200 papers on the subject have been consulted, most of which have already been summarized in this *Bulletin*.

D. H.

GRIZAUD (H.). Au sujet de quelques cas de "fièvre rouge" à la Guadeloupe. [**"Fièvre rouge" in Guadeloupe.**]—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 475–482.

A similar fever has already been described in the Congo under the name of "fièvre rouge Congolese." This disease closely resembles measles but Koplik's spots were not present; it differs from dengue in that muscle and bone pains are not marked. [French writers are of opinion that "fièvre rouge" is dengue.] *D. H.*

SHORTT (H. E.), POOLE (L. T.) & STEPHENS (E. D.). **Sandfly Fever on the Indian Frontier. A Preliminary Note on Some Laboratory Investigations.**—*Indian Jl. Med. Res.* 1934. Apr. Vol. 21. No. 4. pp. 775–788. With 5 charts. [10 refs.]

Blood was taken from cases of sandfly fever in Peshawar on the first and second day of the disease and despatched at once to Kasauli where sandfly fever does not occur. Sixty hours later the blood was inoculated into volunteers with the following results:—

	Blood samples	Positive	Typical fever	Modified
1st day	10	7	6	1
2nd day ...	4	2	1	1
	14	9	7	2

Six samples of blood were filtered through L3 and L5 Chamberland filters and were found to be infective in three instances.

Sandflies fed on cases of sandfly fever and sent to Kasauli and there fed on volunteers produced a typical attack of fever in one case at least.

Monkeys which had been inoculated with the blood of patients showed a definite rise of temperature and the blood of a monkey taken during the fever produced fever in man. *D. H.*

POOLE (L. T.) & SACHS (Albert). **Preliminary Results of an Investigation into the Aetiology of Sandfly Fever.**—*Jl. Roy. Army Med. Corps.* 1934. Aug. Vol. 63. No. 2. pp. 73–79. [11 refs.]

The strength of the troops in the Peshawar district is about 19,000. In one year as many as 2,000 cases of sandfly fever occurred; this high figure is accounted for by the arrival in the district of troops recently landed from England or from other parts of India where sandfly fever is not prevalent; among "salted" troops the incidence is low.

The object of the present investigation was twofold: (1) to show that the short fever met with in the district is true sandfly fever; (2) to show that the disease is not due to a leptospira or other blood parasite.

Clinically the cases conform to the classical description of sandfly fever; 3 days' fever, slow pulse, flushed face, injected eye, frontal headache, etc.

In a previous investigation in 1932 by one of the authors a spirochaete was discovered in culture from the blood of 3 cases; this resembled *T. pallidum* but with more open coils; it was successfully subcultured.

In 1933 in 470 cases blood taken on the first day of the fever was cultivated in Fletcher's leptospira medium; 0·5 cc. of blood was injected into small capsules containing 4 cc. of the culture medium, the capsules were at once sealed and incubated at 25°C. for 15 days and were then examined and if nothing was found incubated for a further 15 days. In not a single case was a leptospira found; 70 per cent. of the cultures were sterile, the others were contaminated by air-borne organisms; only one capsule contained a pathogenic organism, staphylococcus from a septicaemic case. Direct examination of the blood by dark ground illumination and stained film failed to reveal any organism.

Animal experiments.—Whole blood of cases, cultures after incubation and emulsions of sandflies fed and unfed were injected into rats, rabbits and guineapigs; none developed fever and none showed any sign of disease. Sandflies both fed and unfed were examined by dark ground illumination and by stained smear but no leptospira was seen.

Conclusions.—1. The short fevers of the Peshawar district are sandfly fever. 2. The causal agent is not a leptospira or other visible organism. *D. H.*

International Convention for Mutual Protection against Dengue Fever. Athens July 25, 1934. Cmd. 4755. 12 pp. 1934. London: H.M.S.O. [2d.]

RABIES.

A REVIEW OF RECENT ARTICLES. XXII.*

i. *Virus.*

It will be remembered that LEVADITI and SCHOEN (this *Bulletin*, Vol. 31, p. 145) described oxyphil corpuscles which they had observed in the corneal epithelium. As these cells are not neurones though intimately connected with the terminations of the ophthalmic branch of the trigeminal nerve, these authors[1] have examined other ectodermal structures such as the conjunctiva, the nasal mucous membrane, the tongue, and the intestinal mucous membrane. In none of these were oxyphil corpuscles found, though all constitute a favourable place of entry from which the virus of rabies may be dispersed. "From this point of view the corneal epithelium is that which approximates most closely to certain neurones, which in virtue of their neuro-ectodermal origin, facilitate the intracellular evolution of the virus, and thus allows of the development of the visible phase of its cycle of evolution (of the Negri body)."

NICOLAU and KOPCIOWSKA[2] have continued their studies on the effects of rabies virus introduced into the sciatic nerve (this *Bulletin*, Vol. 31, p. 641). They have now directed their attention to the morphogenesis of Negri bodies following this procedure. Negri bodies appear in the neurones of the spinal ganglia of the appropriate segment on the seventh day after infection. The phenomena which precede their appearance have been studied on animals killed at earlier periods. The successive phases of "negrigenesis" are found to be:—(1) agglutination of Nissl granules; (2) flocculation into more or less chromophilic masses; (3) the masses become rounded and more regular and appear to be slightly basophil; (4) these become oxyphilic "under the influence of the germs," and changed in various ways, until they assume the form of Negri bodies. The later changes may be (*a*) the appearance of a small reddish centre which extends throughout the mass, (*b*) the masses become more oxyphilic, or (*c*) a number of oxyphilic points appear, which finally form the "Innenkörper" of the Negri body. "The Negri bodies are formed as a result of the defence of the cell. When inclusions appear in the cell, the cell maintains its morphological and staining integrity. When the cell does not react by the formation of inclusions, the germ multiplies, and degeneration and necrobiosis follow."

From an examination by serial section of the whole brains of 60 mice infected with rabies, and killed at various periods during the course of the disease MURATOWA[3] finds that the first appearance of Negri bodies is not in the horn of Ammon, but in the mesencephalon in the neighbourhood of the central canal. Even when the disease is fully

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* For the twenty-first of this series see Vol. 31, p. 637.

[1] LEVADITI (C.), SCHOEN (R.) & LEVADITI (J.). Evolution du virus rabique des rues dans les éléments épithéliaux dérivés de l'ectoderme et de l'endoderme.—*C. R. Soc. Biol.* 1934. Vol. 117. No. 34. pp. 767–770.

[2] NICOLAU (S.) & KOPCIOWSKA (L.). Étude sur la morphogénèse des corps de Negri.—*Ann. Inst. Pasteur.* 1934. Oct. Vol. 53. No. 4. pp. 418–437. With 22 coloured figs. on 1 double plate. [Refs. in footnotes.]

[3] MURATOWA (A. P.). Ueber die Morphologie des Lyssavirus.—*Zent. f. Bakt.* I. Abt. Orig. 1934. July 2. Vol. 132. No. 1/2. pp. 65–77. With 22 figs.

developed Negri bodies may be absent in the horn of Ammon and in the cerebellum, though present in other parts of the brain. [In this connexion the reviewer would recall the findings of THOMAS and JACKSON and of NICOLAU and KOPCIOWSKA (this *Bulletin*, Vol. 28, p. 744; Vol. 29, p. 600, and Vol. 30, p. 575)]. The author believes that he has observed indications of a definite cycle of development of the parasite of rabies. He believes that the saliva introduced at the time of biting contains very small structures either free or in the form of the Innenkörper of the Negri body. In the muscle the parasite becomes enclosed in a thick membrane and under favourable circumstances reaches a nerve ending. It passes along the nerve to the brain, and becomes freed from its envelope. The freed forms then divide and (mainly in the medulla) form morulae. These spread through the brain, probably along the blood vessels, and penetrate the nerve cells. At this stage they are basophilic, but later they become oxyphilic and take the form of Negri bodies. At a later stage the "Innenkörper" are freed and spread to other parts of the brain forming new Negri bodies. The article is illustrated.

The effect of low temperatures on the virus of rabies has been studied by REMLINGER and BAILLY.[4] They find that when kept in the refrigerator in a frozen state, fixed virus maintained its virulence up to 768 days, and street virus up to 775 days. Also a brain kept in glycerine at + 6°C. remains virulent after 901 days.

It may be remembered that NICOLAU and KOPCIOWSKA (this *Bulletin*, Vol. 28, p. 247) showed that the virulent moiety of rabies brain emulsion is negatively charged and migrates during cataphoresis towards the positive pole, and that GLUSMAN, GORFUNKEL and SSOLOWIEWA (*loc. cit.*, Vol. 29, p. 195) confirmed this observation. The pH range within which this phenomenon was observed was in the case of the former observers between 6·0 and 9·3, and in the case of the latter between 5·8 and 7·4. Further observations are now put forward by SANKARAN, IYENGAR, and BEER,[5] and MCCARRISON, SANKARAN and BEER[6]. These were carried out at a pH of 7·38. Thirty of 33 animals inoculated with material collected from the positive cell developed rabies, whereas none of 33 inoculated with material from the negative cell died. GLUSMAN and his co-workers found no evidence of a separation of the virus from the material to which it is attached. MCCARRISON and his colleagues have found evidence of a considerable degree of separation. The matter is complicated by the fact that at a pH in the neighbourhood of 7·3 most proteins carry negative charges.

The action of various pancreatic ferments on rabies virus has been examined by HIRANO.[7] He finds that the virus is destroyed completely by a 4,000 fold dilution of lipase, and incompletely by an 8,000 fold dilution. The virus on the whole resists the action of trypsin and

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[4] REMLINGER (P.) & BAILLY (J.). Action de la congélation sur le virus rabique. —*C. R. Soc. Biol.* 1934. Vol. 116. No. 20. pp. 407–409.

[5] SANKARAN (G.), IYENGAR (K. R. K.) & BEER (W. A.). A Preliminary Note on the Electrical Charge carried by the Rabies Virus.—*Indian Jl. Med. Res.* 1934. Apr. Vol. 21. No. 4. pp. 909–916. With 2 figs.

[6] MCCARRISON (Robert), SANKARAN (G.) & BEER (W. A.). Electrophoresis Experiments with the Virus of Rabies.—*Indian Jl. Med. Res.* 1934. Apr. Vol. 21. No. 4. pp. 917–934.

[7] HIRANO (Norimasa). On the Resistance of Rabies Virus to the Action of Some Ferments.—*Kitasato Arch. Experim. Med.* 1934. July. Vol. 11. No. 3. pp. 246–252.

diastase, though in low dilution it may be influenced by these ferments. It was not possible to demonstrate the action of pepsin, as it was found that the virus was completely destroyed by the action of 0·01 per cent. hydrochloric acid alone, at 37°C. for two hours. The author concludes that "the rabies virus is composed mainly of a substance which is easily decomposed by pancreatic lipase."

JANSEN[8] has succeeded in transmitting the virus of the pseudorabies of AUJESSKY through 17 passages in the mouse by intracerebral inoculation. The inoculation period was at first 4½ days, and finally was reduced to 3 days. In every case the animal died of the disease. Itching was not an invariable symptom but it was observed in a considerable proportion of the cases. Subcutaneous inoculation into other mice in no case transmitted the infection, but when large doses were given they conferred some degree of immunization. It is the intention of the author to continue this series up to 100 passages.

HURST[9] has continued his study of pseudorabies (this *Bulletin*, Vol. 31, p. 146). From a series of experiments he shows that the Iowa strain of virus reaches the nervous system by way of the peripheral nerves, although it is circulating also in the blood. For example he found that the salivary glands are often infective after intracerebral inoculation or after subcutaneous inoculation into the base of the ear, and rarely if infection is practised subcutaneously in the flank or foot. The adrenals are frequently infective after subcutaneous inoculation into the flank, but not after injection into the leg or ear. Centrifugal spread from the infected nervous tissues by the neural route also occurs. The Aujeszky strain invades the blood stream more readily than does the Iowa strain, but possibly after repeated passage the latter is approximating in this respect more closely to the classical Aujeszky strain. After intravenous inoculation, effective with even small doses, virus is rapidly removed from the blood, and multiple infective foci are established in various organs; thence ascent of the virus by the peripheral nerves leads to infection of the central nervous system. No evidence has been found that the virus can penetrate the haemato-encephalic barrier directly. After subcutaneous inoculation into an area deprived of its nerve supply, the ability of the virus to invade the blood permits it to establish infective foci in the various viscera, and after a predictable delay, the course of infection resembles that following intravenous injection. The virus is pantropic, *i.e.*, it readily attacks cells derived from any embryonic layer.

Following upon a summary of their experiments on the virus of the pseudorabies of AUJESZKY (this *Bulletin*, Vol. 31, p. 639) REMLINGER and BAILLY[10] discuss the nature of this virus in the light of these experiments. There are three possibilities, (1) it may be a protozoon, having a cycle of evolution one stage of which is filtrable; (2) it may be a very minute bacterium; or (3) it may be an enzyme. The facts are

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[8] JANSEN (Jac.). De gevoeligheid van de muis voor het virus van de ziekte van Aujeszky.—*Tijdschr. v. Diergeneesk.* 1934. July 15. Vol. 61. No. 14. pp. 761–763. English summary (9 lines).

[9] HURST (E. Weston). Studies on Pseudorabies (Infectious Bulbar Paralysis, Mad Itch). II. Routes of Infection in the Rabbit, with Remarks on the Relation of the Virus to Other Viruses affecting the Nervous System.—*Jl. Experim. Med.* 1934. June 1. Vol. 59. No. 6. pp. 729–749. [28 refs.]

[10] REMLINGER (P.) & BAILLY (J.). Contribution à l'étude de la nature du virus de la maladie d'Aujeszky.—*C. R. Soc. Biol.* 1934. Vol. 117. No. 31. pp. 409–411.

that the virus if filtrable, is diffusible, is not brought down by centrifugation, and can reproduce the disease in series. The diffusibility excludes the virus from the protozoa and the bacteria, and brings it into approximation with chemical substances. In agreement with this view is the insensitiveness of the virus to centrifugaton. The virus, however, can only traverse porcelain filters of a certain porosity, and has in addition the property of reproducing the disease in series, a property which is possessed by bacteria. The authors ask themselves whether it is possible that the virus occupies an intermediate position between the visible microbes and the diastases. REMLINGER has made a similar suggestion with regard to the virus of rabies (*Bull. Acad. Méd.* 1918, Vol. 79, p. 137).

A strain of the virus of Aujeszky has been isolated in Rumania by JONNESCO.[11, 12] Its properties are described. It was transmitted to the cock. In one case an inoculated cock developed symptoms 72 hours after infection. These persisted for 5 days, after which the animal recovered. The blood of this animal inoculated intracerebrally into rabbits reproduced the disease in a fatal form. Various pathological observations are recounted. In dogs a marked leucocytosis was observed, the white cells numbering 27,000 per cubic millimetre ; a differential count showed 62 per cent. of polymorphs, 4 per cent. of neutrophil metamyelocytes, 8 per cent. of lymphocytes, 12 per cent. of monocytes, and 5 per cent. of plasma cells. The polymorphs contained few granules, and showed degenerative changes. The histological appearances in the tissues are also described.

ii. *Symptomatology and Diagnosis.*

WINTER[13] reports upon an outbreak of rabies amongst animals in Barrackpore (Bengal) upon which one fatal case of hydrophobia in a woman supervened. In her case the period of incubation was 41 days ; as she had not been bitten and she stated that she had not been licked, no treatment was given. Further evidence, however, showed that she had in all probability been licked.

JONNESCO[14] compares results obtained by subdural inoculation of 0·2 cc. of rabid brain emulsion into rabbits, with those obtained by intracaudal inoculation of 0·1 cc. of the same emulsion into mice. In all cases the emulsion contained street virus. The results were as follows. By subdural inoculation of 30 rabbits, 3 became paralysed in less than 7 days, 12 between the 8th and the 15th days, 11 between the 16th and the 28th days, and 4 between the 28th and the 48th days. Of 56 intracaudally inoculated mice 3 became paralysed in less than 7 days, 38 between the 8th and 15th days and 10 between the 16th and 28th days. He therefore recommends the latter method as being almost as sure, more economical, and often more rapid than the former. Two mice should be inoculated on each occasion.

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[11] JONNESCO (Démètre). Recherches sur la maladie d'Aujesky.—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1184–1186.

[12] JONNESCO (Démètre). Contribution à l'étude de la maladie d'Aujesky.—*Ann. Inst. Pasteur.* 1934. Nov. Vol. 53. No. 5. pp. 554–563.

[13] WINTER (H. G.). Hydrophobia.—*Jl. Roy. Army Med. Corps.* 1934. Aug. Vol. 63. No. 2. pp. 122–125.

[14] JONNESCO (Démètre). Diagnostic de la rage au moyen de l'inoculation intracaudale chez la souris.—*C. R. Soc. Biol.* 1934. Vol. 116. No. 21. pp. 545–548. With 1 chart.

iii. *Pathology.*

The histological appearances in the brains of 16 cases of human rabies are described by VERHAART.[15] In all cases there was severe inflammation in the medulla oblongata and the pons, in particular in the tegmentum, the cranial nerve nuclei, and the reticular nuclei. In one atypical case with a prolonged course, the olive and the pes pontes were more affected than the tegmentum. Of the 16, 2 showed definite, and 7 slight, inflammation in the mesencephalon, in particular in the red nucleus, and the corpora quadrigemina, whilst in one case the substantia nigra was alone affected. No inflammation was observed in the diencephalon unless the mesencephalon was also affected, nor in the mesencephalon unless the pons and medulla were also affected. The inflammation took the form of perivascular and diffuse infiltration by lymphocytes, polymorphonuclear leucocytes, and enlarged microglia.

The effects of various processes which affect the haemato-encephalic barrier have been studied by FUNAYAMA.[16, 17] Injection into the subarachnoid space of horse serum, dog serum, a 5 per cent. solution of sodium aleuronate, or pumping, along with intracerebral injection of various fixed virus strains, did not induce rabies in the case of strains of fixed virus of incubation 5 and 6 days, but induced symptoms in an 8-day strain. It was also noted that " the alteration in the haemato-encephalic barrier had no effect on fixed virus which had been introduced into the circulation."

REMLINGER and BAILLY[18] extend their observations on the presence of rabies virus in the lung (this *Bulletin*, Vol. 31, p. 640). They have now succeeded in demonstrating its presence 9 times out of 24, *i.e.*, 37·5 per cent. The lung must thus possess a sufficient number of infected neurones to produce these infections. They may be situated in the nerve endings of the muscular and mucous coats of the bronchioles, in the nerve endings in the vessel walls, or in those in the alveolar epithelium described by RETZIUS.

MATSUDA[19] has carried out a series of experiments on the irritability of the intestinal sympathetic and parasympathetic nerve endings during the course of infection with rabies virus. He ascribes the results which he obtained to the presence of inflammation in the intestinal canal, and to invasion by the virus of the whole nervous system from the nerve centres down to the nerve endings. As regards the parasympathetic, half the cases were sensitive to acetyl choline and atropine; as regards the sympathetic, half were in the early stages sensitive to

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[15] VERHAART (W. J. C.). De encephalitis bij de menschelijke lyssa.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. May 22. Vol. 74. No. 11. pp. 681–687. German summary.

[16] FUNAYAMA (Jün-Itchi). Contribution à l'étude de la rage expérimentale.—*Oriental Jl. Dis. Infants.* 1934. May. Vol. 15. No. 3. [In Japanese. [24 refs.] French summary pp. 43–46.]

[17] FUNAYAMA (Jün-Itchi). Contribution à l'étude de la rage expérimentale.—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1170–1172.

[18] REMLINGER (P.) & BAILLY (J.). Sur la présence du virus rabique dans le poumon.—*Ann. Inst. Pasteur.* 1934. July. Vol. 53. No. 1. pp. 43–50.

[19] MATSUDA (Shoitsu). The Contribution on the Knowledge of the Experimental Rabies. (Report I.) The Investigation of the Intestinal Canal of Rabid Rabbits. 1. The Change of the Irritability of Autonomous Nervous System and Involantary Muscle in Intestinal Canal of Rabid (Hydrophobic) Rabbits.—*Oriental Jl. Dis. Infants.* 1934. July. Vol. 16. No. 1. [In Japanese. English summary pp. 1–4.]

adrenaline, this sensitiveness disappearing as paresis set in. Further observations on the sympathetic nerve endings of the vessels indicated an increase in sensitiveness, which in certain cases weakened as paresis set in. [This précis is made from an English summary which is difficult to interpret, and its accuracy cannot be vouched for.]

iv. *Methods of Treatment and Statistics.*

During the year 1933, 132 cases of persons bitten by dogs have been reported in Germany,[20] as compared with 64 in the previous year. Of the 132, 2 died of rabies, and in neither case had treatment been given. Actually 153 persons were treated during the year, 47 in Berlin, 97 in Breslau, 1 in Munich, and 8 in Dresden. Of these none contracted rabies, and no paralytic nor other sequelae were observed. Attention is drawn to the increase in the prevalence of rabies in Germany, and especially in the Eastern districts bordering on Poland and Czechoslovakia.

VIALA[21] reports that during the year 1933, 443 persons were treated at the Pasteur Institute at Paris. There were no failures of treatment, nor were any post-vaccinial sequelae observed.

v. *Rabies in Animals.*

REICHEL and SCHNEIDER[22] recommend intra-lingual inoculation of the test dose in estimating degree of immunization. They consider a protection test to be satisfactory when at least 60 per cent. of the vaccinated animals survive, while 60 per cent. or more of the controls die of the intra-lingual infecting dose. From a series of experiments on rabbits they found that when given in single doses, formalin-killed and autoclave-killed vaccines failed to pass the test, whilst live vaccine, chloroform-killed and phenol-killed vaccines all passed the test.

In a second communication[23] the test is further applied. Treatment for 14 days with both carbolized and chloroform treated vaccines gave adequate protection. They then compared the immunizing properties of carbolized vaccines kept at room temperature for various periods. The results of this experiment are as follows :—

Date of preparation of vaccine.	Number treated	Died of rabies
1929	5	5
1930	5	5
1931	4	1
1932 (1st 6 months)	3	0
1932 (2nd ,,)	4	0
1933	5	2
Normal rabbit brain	4	3
Controls	35	29

(Doses of 2 cc. of a 5 per cent. emulsion were given daily for 7 days in each case.)

[20] REICHS-GESUNDHEITSBLATT. 1934. Oct. 31. Vol. 9. No. 44. pp. 932–933.—Die Tätigkeit der deutschen Wutschutzstationen im Jahre 1933.

[21] VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1933.—*Ann. Inst. Pasteur.* 1934. June. Vol. 52. No. 6. pp. 709–713.

[22] REICHEL (John) & SCHNEIDER (J. E.). Rabies Vaccine Protection Test.—*Jl. Amer. Vet. Med. Assoc.* 1934. May. Vol. 84. No. 5. pp. 752–756.

[23] REICHEL (John) & SCHNEIDER (J. E.). Rabies Vaccine Protection Tests.—*Amer. Jl. Pub. Health.* 1934. June. Vol. 24. No. 6. Pt. 1. pp. 625–628.

The authors conclude that " Rabies vaccine (phenol killed) kept at room temperature for 2 years satisfactorily passed the protection test, supporting the contention that rabies vaccine can be dated for 2 years from the date of issue."

The effects of single dose administration of various vaccines as a prophylactic against rabies have been examined by BARNES, METCALFE, MARTINDALE and LENTZ.[24] The conclusions arrived at are stated to be tentative. They found that administration of single doses of 4 carbolized vaccines to 4 groups of 10 dogs gave no protection—" 33 of the total of 40 contracted rabies (*i.e.*, 82·5 per cent.) whereas 13 of 16 untreated succumbed (81·3 per cent.)." A second series of experiments in which chloroform treated vaccine was used gave " somewhat more encouraging results, but not sufficient to warrant confidence in it to the exclusion of police and sanitary measures." In this case, of 20 vaccinated dogs 7 (35 per cent.) died of rabies, whereas of 20 controls 11 (55 per cent.) succumbed.

vi. *Post-vaccinial Paralyses.*

A fatal case of transverse myelitis following antirabic treatment at the Instituto de Semiologia (Argentine) is described by UDAONDO, SANGUINETTI, and ZUNINO.[25] The patient was a veterinary surgeon. He had been in contact with a dog suffering from furious rabies, but had not been bitten or scratched by it. He had disinfected his hands immediately after he had handled the animal. He commenced treatment 8 days after, and 14 days thereafter symptoms set in. These were mainly of the nature of an ascending anaesthesia, with paralysis of the lower limbs. After an illness of seven days the patient died, and the histological appearances (which are illustrated) were those of a subacute necrotic transverse myelitis in the cervical region. A discussion of the aetiology of paralytic accidents follows.

MARINESCO and DRAGANESCO[26] discuss a case of paralytic accident which exhibited the symptoms of the Landry type and terminated fatally. The patient had been treated by heated emulsions according to the method of Babes. Symptoms appeared on the 15th day and death followed 5 days later. The tissues were examined. Rabbits inoculated subdurally with the nerve tissue developed paralysis on the third day and died after the 5th or 6th day. The authors draw attention to the view of REMLINGER that cases in which the presence of rabies virus is proved by animal experiment should be excluded from the category of paralytic accident, and should be ascribed to errors of manipulation in the laboratory. The authors do not, with regard to this particular case, subscribe to this generally accepted view. They state that this virus vaccine, though admittedly virulent, has been employed without ill effects on a large series of cases. They suggest that in this case a reinforced strain of street virus may have been operating.

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[24] BARNES (M. F.), METCALFE (A. N.), MARTINDALE (W. E.) & LENTZ (W. J.). Canine Rabies Experimental Vaccination. Second and Third Reports.—*Jl. Amer. Vet. Med. Assoc.* 1934. May. Vol. 84. No. 5. pp. 740–751.

[25] UDAONDO (C. Bonorino), SANGUINETTI (Lucio V.) & ZUNINO (Livio V.). Mielitis mortal por vacunación antirrábica.—*Prensa Méd. Argentina.* 1934. Aug. 22. Vol. 21. No. 34. pp. 1565–1570. With 3 figs. [22 refs.]

[26] MARINESCO (G.) & DRAGANESCO (St.). Étude anatomoclinique et expérimentale d'un cas d'encèphalomyélite rabique survenue au cours d'un traitement pasteurien.—*Bull. Acad. Méd.* 1934. July 31. 98th Year. 3rd Ser. Vol. 112. No. 29. pp. 181–189.

vii. *Miscellaneous.*

PROCA, BOBES and JONNESCO[27] have continued their studies in which they employ intraplantar inoculation as the mode of transmission (this *Bulletin*, Vol. 31, p. 642). This method is peculiarly suitable for the study of the effects of local treatment. They find that, when antirabic serum is injected in the same locality, it has a definite preventive action; twelve out of sixteen treated animals survived. When formate and salicylate of sodium were added to the serum the action of the serum was reinforced, but on the contrary the action was diminished when the serum was kept for some time in dilution in the presence of an antiseptic, such as phenol, formate or salicylate of soda.

GONZÁLEZ[28] continues the memoir on rabies, the earlier part of which has already been reviewed, by a section on the clinical aspects of fatal human cases. Twenty-eight case histories dating from 1919 to 1931 are given in detail. *A. G. McKendrick.*

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[27] PROCA (G.), BOBES (S.) & JONNESCO (D.). Sur quelques essais de sérothérapie locale de la rage.—*C. R. Soc. Biol.* 1934. Vol. 117. No. 28. pp. 133–135.

[28] GONZÁLEZ (Hernán D.). La rabia humana.—*Semana Méd.* 1934. May 3. Vol. 41. No. 18 (2103). pp. 1373–1395. With 26 charts. [59 refs.]

TROPICAL DERMATOLOGY.

A REVIEW OF RECENT ARTICLES. I.

Blastomycosis.—CASTELLANI and JACONO[1] have analysed the characteristic features of fungi isolated from cases seen in North America and Europe. In dealing with the vexed question of diagnosis they make the following definition :—" The term ' blastomycosis ' is used to indicate any disease due to fungi, which appear in the lesions as roundish or oval cells, at times budding, *with complete absence of mycelium.*" Under this ruling there are two main types ; (1) Blastomycoides with well-defined membranes, double contours and well-marked fat-droplets ; (2) Cryptococcoid type of smaller cells with the double contours much less marked and the spherules finer. In the series under discussion there were six cases of pulmonary and 23 of dermal infection. Full histological and cultural details are given of the 25 fungi isolated, the five principal organisms being *Geotrichum immite, G. dermatitidis, Monosporium tulanense, Glenospora lanuginosa* and *Acrotheca pedrosoi.* The paper also includes an account of the experimental results obtained in skin tests with a blastomycetin, prepared in the same way as old tuberculin. In experimentally infected rats scratch and intradermic tests always gave positive flares. Seven healthy controls gave negative results whilst four affected patients yielded two positive and one doubtful reactions. REDAELLI and CIFERRI[2] studied the cultural, morphological, biochemical and pathogenic properties of four strains obtained from cases of Gilchrist's disease seen in North and South America. These fungi had been labelled *Endomyces dermatitidis, E. capsulatus* Rewbridge, *E. capsulatus* var. *isabellinus* and *Blastomyces gilchristi.* They seemed to be identical. The authors examine the whole genus *Blastomyces* and as a result separate a genus to which they give the name *Gilchristia dermatitidis* and which has eleven different synonyms. This group differs from the Endomyces in the possession of 8-spored asci, absence of fermentative power, cultural reversible dimorphism, etc. ROTTER and CHAVARRIA[3] describe three cases seen in Costa Rica. The first occurred in a 70-year old agricultural labourer. The appearance presented by the right hand and forearm were clinically typical. There was no glandular involvement and *Hormodendron langeroni* was cultivated. In a male negro lesions first appeared round the mouth and thence gradually spread to the neck and back. The case corresponded in every way to those described as Brazilian Paracoccidioidosis. The third case is interesting in that the lesions occurred on the forehead shortly after a wasp sting in that area.

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[1] CASTELLANI (Aldo) & JACONO (Igino). Observations on Fungi isolated from Cases of Blastomycosis Cutis and Blastomycosis Pulmonalis in North America and Europe. Remarks on Blastomycetin.—*Jl. Trop. Med. & Hyg.* 1933. Oct. 16. Vol. 36. No. 20. pp. 297–321. With 56 figs. & 1 coloured plate. [76 refs.]

[2] REDAELLI (P.) & CIFERRI (R.). *Gilchristia dermatitidis* (Gilchr. et Stokes) Cif. et Red., the Causative Agent of the American Gilchrist Disease (Dermatitis Verrucosa).—*Jl. Trop. Med. & Hyg.* 1934. Sept. 15. Vol. 37. No. 18. pp. 280–282. [21 refs.]

[3] ROTTER (Werner) & CHAVARRIA (A. Peña). Weitere Untersuchungen ueber Blastomykosen in Costa Rica.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Oct. Vol. 38. No. 10. pp. 406–417. With 11 text figs.

New patches of infection have since involved the right ear and neck. The causative organism in this case is to be the subject of a later communication.

Lymphostatic verrucosis.—LOEWENTHAL[4] has also endeavoured to clarify the confusion which exists in our knowledge of the fungus diseases. He deals in particular with "Mossy foot," Dermatitis verrucosa and verrucosis associated with chronic oedema, a name given to cases seen in Uganda. He studies this last type in particular and describes 11 such examples. These have a prodromal stage of "velvet" skin, succeeded by oedema and sharply defined verrucosity. There is no tenderness, but ulceration and fibromata occur later. In eight of the cases no cause could be found for the oedema apart from the local lesion. Microscopically there are no giant-cells and no obvious organisms. For this Uganda type he suggests the name "Lymphostatic verrucosis." In "Mossy foot" the presence of an organism is also probable but unproven, but the clinical features serve to distinguish the two diseases, whilst dermatitis verrucosa is of course a synonym for blastomycosis.

Mycetoma.—MONTPELLIER and CATANEI[5] obtained material from the amputated foot of a native in Algiers. There was a regular swelling of the ankle which had existed for several months, together with some cicatricial nodules and others of a dirty grey colour containing small abscess cavities. The organism proved to be *Acremonium potroni.* With GOINARD[6], CATANEI describes a second case in a native male aged 30. Here the foot showed diffuse swelling, particularly of the sole on which there were 30 or so small brownish papules, a few fistulae and some scarring. *Allescheria boydii,* Shear 1921, was isolated. In his third publication CATANEI[7] adds a third example, this time in a male native 40 years of age. When seen, five years after onset, there was hypertrophy of the dorsum of the foot with numerous nodules of varying induration and some fistulae. *Nocardia madurae* was proved to be responsible, as is usually the case in Algeria. Another case is reported from Brazil by GONZAGA & LEÃO.[8] A man, 24 years of age, who had lived practically all his life in S. Paulo developed small subcutaneous nodules near the tibial tuberosities of both legs. These were painful and attached to the skin, but were movable over the deeper tissues. The lesions on the left leg broke down to form ulcers discharging a yellowish, viscid pus. The patient became pale and weak, whilst the spleen could be felt three fingers' breadths below the costal margin. The presence of fungus was proved. The article also

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[4] LOEWENTHAL (L. J. A.). On the Probable Inclusion of Several Diseases in the Title "Mossy" Foot.—*Ann. Trop. Med. & Parasit.* 1934. Mar. 29. Vol. 28. No. 1. pp. 47–62. With 5 figs. (2 coloured) on 3 plates. [37 refs.]

[5] MONTPELLIER (J.) & CATANEI (A.). Résultats de l'étude d'un nouveau mycétome du pied observé a Alger.—*Bull. Soc. Path. Exot.* 1934. Mar. 14. Vol. 27. No. 3. pp. 209–214. With 1 fig.

[6] CATANEI (A.) & GOINARD (P.). Un nouveau cas algérien de mycétome du pied.—*Bull. Soc. Path. Exot.* 1934. Feb. 14. Vol. 27. No. 2. pp. 176–178. With 2 figs.

[7] CATANEI (A.). Étude parasitologique de trois mycétomes du pied observés en Algérie, en 1933.—*Arch. Inst. Pasteur d'Algérie.* 1934. June. Vol. 12. No. 2. pp. 169–180. With 7 figs. & 1 plate.

[8] GONZAGA (A. Gavião) & LEÃO (A. E. Arêa). Acremoniose (mycose por acremonium).—*Rev. Med.-Cirurg. do Brasil.* 1934. Jan. Vol. 42. No. 1. pp. 24–32. With 12 figs. (11 on 4 plates).

contains histological and cultural details, etc., of the two species *Acremonium muthuoni* and *A. potroni*.

Actinomycosis.—A very well-illustrated article by CH'IN[9] describes three cases seen in Peiping, China. A Greek farmer, aged 55 years, gave a six months' history of fever and cough. Empyema necessitated thoracostomy which left the patient with thickened pleura and some fluid in the left chest. Scarring was present together with a few sinuses discharging a thin, yellowish, foul pus. Death ensued despite treatment and it was only post-mortem that the fungus was found in abscesses of the pleura and lung. The second case occurred in a Chinese girl student, aged 22, who had had some swelling of the right side of the face for five weeks. There were no sinuses, but X-rays revealed osteomyelitis of the mandible. The lesion was incised and drained, typical granules being found in the pus. Lugol's solution was given by mouth and local treatment with radium was instituted. Rapid healing followed and there was no relapse six months after the cessation of treatment. Finally there is described the case of a Russian housewife, aged 45, who developed a local swelling two months after appendicectomy. A second laparotomy revealed a large, inoperable mass attached to a sinus which was present at the lower end of the original scar. Pus obtained from this sinus and from the mass post-mortem contained typical ray fungi which proved to be *Nocardia bovis* on culture.

Piedra.—BRUMPT and LANGERON[10] have examined material sent from Venezuela. The specimen proved too old for culture but they are of the opinion that, on histological grounds, the fungus constitutes a new species. They propose to name it *Piedra venezuelensis*. The authors also discuss the microscopical appearances presented by *P. hortai* and *P. sarmentoi*, and demonstrate that in these fungi the asci contain eight ascospores, whereas in the new species only four are present. A general historical review points out that this malady differs from Trichomycosis in that the small sand-like nodules are found almost exclusively on the hairs of the scalp. In South America the nodules are dark in colour, whereas they are light in cases occurring in the Old World, where *Trichosporum* is responsible.

Tinea tonsurans.—A preliminary statistical note on the incidence of ringworm of the scalp in Spanish Morocco is presented by BAEZA.[11] Children, adolescents and native troops were examined, Of 2,708 persons thus inspected 304 were proved to be infected with favus, 156 with *Trichophyton violaceum*, three with *T. sulphureum* and one with both these latter fungi. Of the 464 infections, 393 occurred in small boys, 52 in youths, 12 in girls, and 7 in soldiers. The author nowhere notes the site of the infection but it is presumed that he is dealing with the scalp. The following three points are worthy of note : the absence of microsporon infections, the high percentage of favus and the small

[9] CH'IN (T. L.). A Mycological Study of a Case of Actinomycosis with a Report of Three Cases observed in North China.—*Chinese Med. Jl.* 1934. June. Vol. 48. No. 6. pp. 551–562. With 10 figs. on 4 plates. [25 refs.]

[10] BRUMPT (E.) & LANGERON (M.). Considérations sur la piedra de l'Amérique du Sud, à l'occasion d'un cas provenant du Venezuela. Description d'une espèce nouvelle *Piedraia venezuelensis* n. sp.—*Ann. Parasit. Humaine et Comparée.* 1934. Mar. 1. Vol. 12. No. 2. pp. 134–161. With 32 figs. & 1 plate. [33 refs.]

[11] BAEZA (M.). Note statistique préliminaire sur les teignes du Maroc espagnol.—*Ann. Parasit. Humaine et Comparée.* 1934. Sept. 1. Vol. 12. No. 5. pp. 405–407.

variety of fungi. The paper by ALDICK[12] deals with an outbreak of *Microsporon audouini* cases in Schleswig-Holstein. There were seen 301 cases of scalp disease, 10 per cent. of the patients also showing lesions of the glabrous skin. The importance of this paper lies in the apparent simplicity and efficiency of the treatment. In pure chloroform there is dissolved 2 per cent. of absolute alcohol and 1 per cent. of cinnamylic acid. The scalp is painted three times a day with this lotion, care being taken to prevent contact with the eyes. Cure occurred in four to five weeks in the vast majority of cases. Failure is reported in 4·3 per cent. of boys and in 14·2 per cent. of girls, whose longer hair was apparently never cut in this series.

Tinea circinata.—KAMBAYASHI[13] reports the laboratory findings in material obtained from a 12-year old Chinese boy living near Shanghai. The lesions are described as typical of T. circinata and were situated on the right ala nasi and temple. Very detailed observations are given of the histological and cultural features of the fungus, which also proved pathological to guineapigs on subcutaneous and intraperitoneal inoculation. The organism is very like that described in 1925 by the authors whose names are attached to its title, *Malbranchea Bolognesi-Chiurcoi* Vuillemin.

Tinea imbricata.—After tracing the history of this disease from Malaya to the adjacent countries, ACTON & GHOSH[14] give details of the first definite example to be recognized in India. This occurred in a Bengali youth, aged twenty, who acquired the malady in childhood. He had never left his home district, which is bordered by the Garo hills, but it is possible that he gained his infection by direct contact with visitors from these hills. The case was at first thought to be one of generalized exfoliative dermatitis, but careful examination revealed some concentric rings on the back. Culture was successful but inoculation into guineapigs failed. A volunteer was, however, infected by rubbing an emulsion of the culture into a scarified area of the forearm. It is pointed out that the cultural characteristics vary very greatly both with the medium used and with the oxygen supply. The authors consider that CASTELLANI's creation of the genus *Endodermophyton* is unnecessary. As this particular fungus showed features common to both *E. tropicale* and *E. indicum*, they suggest the name *Achorion indicum*, Castellani 1911. It is possible, however, that all four endophyta are but a single species (*i.e.*, *E. concentricum* and *E. mansoni* in addition to the above). If this is proved, the organism should be called *A. concentricum*, Blanchard 1901.

Epidermophytosis.—NIÑO[15] describes a typical case in a Spaniard, the sole of whose left foot was affected. The majority of the lesions were between and near the toes and also on the heel. It is stated that

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[12] ALDICK (W.). Ueber eine Mikrosporieepidemie in Schleswig-Holstein und ihre Behandlung mit Zimtchloroform.—*Arch. f. Dermat. u. Syph.* 1934. Sept. 14. Vol. 170. No. 4. pp. 473–484. With 6 figs.

[13] KAMBAYASHI (T.). Ueber ein von einer Spezies der Malbranchea hervorgerufenes Hautleiden in China.—*Arch. f. Dermat. u. Syph.* 1934. Apr. 20. Vol. 170. No. 1. pp. 97–106. With 50 figs.

[14] ACTON (H. W.) & GHOSH (L. M.). Tinea Imbricata (Tokelau) in Bengal.—*Indian Med. Gaz.* 1934. Aug. Vol. 69. No. 8. pp. 426–430. With 2 plates (1 coloured).

[15] NIÑO (Flavio L.). Epidermoficia plantar dishidrosiforme.—*Bol. Inst. Clín. Quirúrg.* 1934. Vol. 10. Nos. 82 & 83. pp. 21–24. With 12 figs.

the condition cleared up after being painted with Tr. Iodi and Biodermol. Culture proved the fungus to be *Epidermophyton flocosum*, Harz. SOUTER[16] discusses his experiences in Hong-Kong itself. In cases where secondary infection has occurred it is his custom to deal with this first by means of a staphylococcal antivirus. Thereafter cleanliness and clearance of dead skin are essential. These aims being achieved, Mycosil is most useful. Whitfield's lotion and Castellani's paint earn equally high praise. In the succeeding paper of the same journal, HAYES[17] describes the condition as seen in South Africa. The treatment there recommended is a paint of brilliant green in a strength not exceeding 10 per cent.

Moniliasis.—The intradermic reactions caused by levurine and by a similar monilial preparation are discussed by NEGRONI.[18] Agglutination and intradermic tests both proved unreliable, both false negatives and false positives being given. Complement fixation tests were, however, positive in 38 out of 50 cases.

Streptococcal dermatitis.—OTHAZ[19] records his results in 54 patients suffering from "streptococcal infections of the skin" who were treated by means of intravenous injections of ammoniacal copper sulphate. At first the daily dose consists of 0·02 to 0·04 gm.; this is gradually increased to 0·06 or 0·08 gm. Larger doses require an interval of 48 hours between each. It is stated that the method is satisfactory and that no other local or general measures are required.

Lupus erythematosus.—Five cases in the Philippines are described by HASSELMANN[20]; of these, three were Japanese, one an American and the other a native girl. Only this last example is noted in detail. She had a typical lesion of the left buttock which cleared up on gold injections and local painting with Tr. Iodi. The histology was atypical in that a lymphoid cellular infiltration was more marked than is usual and some Langhan's giant cells were seen although no tubercles were present. There were no apple-jelly nodules, and no relapse occurred during two years' observation.

Colour Changes.—A most instructive article has been written by LOEWENTHAL[21], who first considers the normal variations in the distribution of pigment in the African's skin, *e.g.*, the usual lighter shades seen over the clavicles, thoracic spine, supraorbital ridges, tip of nose, etc. Pathological pallor can be produced by "masking," an effect resultant on the presence of hyperkeratosis, oedema, stretching and circulatory disturbances of the skin. The actual amount of pigment

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[16] SOUTER (J. C.). A Practical Note on Hong Kong Foot, or Dhobie Itch.—*Jl. Roy. Nav. Med. Serv.* 1934. Oct. Vol. 20. No. 4. pp. 369–372.

[17] HAYES (G. H.). Epidermophyton Infection or Athlete's Foot.—*Jl. Roy. Nav. Med. Serv.* 1934. Oct. Vol. 20. No. 4. pp. 372–373.

[18] NEGRONI (Pablo). Réactions biologiques dans les monilioses cutanéo-muqueuses. Leur valeur comparative.—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1934. Feb. Vol. 5. No. 2. pp. 65–74.

[19] OTHAZ (Ernesto L.). Tratamiento de las enfermedades estreptocóccicas de la piel por el sulfato de cobre amoniacal endovenoso.—*Semana Méd.* 1934. June 7. Vol. 41. No. 23 (2108). pp. 1734–1743. With 10 figs.

[20] HASSELMANN (C. M.). Lupus Erythematosus (Discoideus) in the Tropics. First Report of Cases from the Philippine Islands and Investigations on the Occurrence of Langhan's Giant Cells.—*Arch. Dermat. & Syph.* 1934. Apr. Vol. 29. No. 4. pp. 585–596. With 6 figs. [20 refs.]

[21] LOEWENTHAL (L. J. A.). The Significance of Colour Changes in the African Skin.—*East African Med. Jl.* 1934. July. Vol. 11. No. 4. pp. 124–131. With 2 figs. [22 refs.]

may be reduced after inflammation has subsided, in neurotrophic lesions, etc. Circulatory changes having this effect are caused by the fevers, pityriasis rosea and urticaria. The mycoses nearly all produce relative pallor, as also do vitiligo, leprosy, late yaws, etc. On the other hand darkening results from extraneous colouring, an increase in melanin or keratin and as a sequel to folding of the epidermis. Exposure to sun and pregnancy are included in the physiological causes, whilst moles are of course congenital. Extraneous agents include chemicals and Tinea nigra. Lichenification, late yaws and keratosis follicularis have the same effect. *M. Sydney Thomson.*

AMOEBIASIS AND DYSENTERY.

Amoebiasis.

Talamonti (Luigi). L'amebiasi in Migiurtinia. [**Amoebiasis in Migiurtinia.**]—*Arch. Ital. Sci. Med. Colon.* 1934. Oct. 1. Vol. 15. No. 10. pp. 778–784. English summary (5 lines).

Migiurtinia is in the north-east of Italian Somaliland. Diarrhoea is common among the inhabitants. In two years August 1931–July 1933, sixty-two out of 197 deaths were registered as due to enterocolitis. The author, who was pathologist and Director at the Dante Hospital examined in 4½ months the stools of 900 persons, some suffering from diarrhoea but who had not had any treatment for it, others after a saline purge. He found *E. histolytica* in 409 or 45 per cent. He thinks there are three causes for this high incidence of infection: (1) the impure quality of the water—wells liable to contamination; (2) flies, present in enormous numbers during the monsoon period October to April; (3) personal contact between the healthy and those suffering from dysentery or passing the cysts of *E. histolytica* [as regards the risk of these last, see this *Bulletin*, Vol. 31, p. 734]. *H. H. S.*

Kawai (T.), Nagayoshi (Y.) & Koo (C.). **A Survey of the Human Intestinal Protozoa in North Formosa.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. Aug. Vol. 33. No. 8 (353). [In Japanese. pp. 1149–1158. [34 refs.] English summary pp. 115–116.]

From the examination of a single stool specimen from 616 Chinese coolies and Japanese officials in Formosa the authors have found all the common intestinal protozoa with the exception of *Chilomastix mesnili*. Of *Entamoeba histolytica* there were 103 cases of which 96·12 per cent. gave no history of amoebiasis or other similar disease.

C. M. Wenyon.

Kan (Y.). **Results of Fecal Examination for Human Intestinal Protozoa in South Formosa.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. May. Vol. 33. No. 5 (350). [In Japanese pp. 823–831. [30 refs.] English summary pp. 87–88.]

At a small village, Hozan, in South Formosa the author examined for intestinal protozoa 40 Japanese marines and 156 Chinese school children. The Japanese showed an absence of *Entamoeba histolytica* and *Chilomastix mesnili* both of which were encountered amongst the children. Both groups showed *E. coli*, *E. bütschlii* and *E. nana* but an absence of trichomonas. *C. M. W.*

Hirayama (Sigeki). Statistische Betrachtung und morphologische und biologische Studien ueber die parasitischen Amoeben des menschlichen Darmkanals. [**Intestinal Amoebae found in Kyusu, Japan.**]—*Fukuoka-Ikwadaigaku-Zasshi* (*Fukuoka Acta Med.*). 1934. Apr. Vol. 27. No. 4. [In Japanese. pp. 719–832. With 4 plates. [129 refs.] German summary pp. 35–37.]

A note on the examination for intestinal amoebae of 225 healthy and sick persons in the Kyûsû district of Japan. In 51·1 per cent. one

or other of the 5 amoebae of man was found. *E. histolytica* was present in 6·7, *E. coli* in 18·7, *E. nana* in 36·9, *I. bütschlii* in 6·7, and *Dientamoeba fragilis* in 12. *C. M. W.*

HINSHAW (H. Corwin) & SHOWERS (Ethel M.). **A Survey of Human Intestinal Protozoan Parasites in Philadelphia.**—*Amer. Jl. Med. Sci.* 1934. July. Vol. 188. No. 1. pp. 108–116. [11 refs.]

The examination of 535 faecal specimens from 358 patients in the medical wards of a general hospital in Philadelphia during the winter of 1932–1933 revealed all the common intestinal protozoa of man. The highest incidence was 17·4 per cent. infected with *Endolimax nana* and the lowest 0·3 per cent. with *Dientamoeba fragilis*. *Entamoeba histolytica* occurred in 1·1 per cent. *C. M. W.*

ARNETT (John H.) & STABLER (R. M.). *Endamoeba histolytica*: **its Incidence in 1060 Philadelphia Students: its Morphological Characteristics.**—*Trans. College of Physicians of Philadelphia.* 1934. 4th Ser. Vol. 2. No. 2. pp. 181–182.

In the entire group were found—*Blastocystis* 63·2 per cent.; *E. coli* 14·5; *Endolimax nana* 11·4; *Giardia* 7·5; *Dientamoeba* 4·3; *Iodamoeba* 1·0; *Chilomastix* 0·94; *E. histolytica* 4·1 per cent.

H. M. Hanschell.

OWEN (William B.), HONESS (Ralph F.) & SIMON (James R.). **Protozoal Infestations of American Indian Children.**—*Jl. Amer. Med. Assoc.* 1934. Mar. 24. Vol. 102. No. 12. pp. 913–915. [11 refs.]

The examination of 83 North American Indian boys in Wyoming has revealed a very high incidence of intestinal protozoa. The results show that 93·9 per cent. were positive for one or more of the common forms. The percentage of infections were *E. coli* 68·6, *E. nana* 55·4, *I. bütschlii* 34·9, *E. histolytica* 26·5, *Giardia* 21·6, *Chilomastix* 2·4. This high infection rate appeared to be definitely attributable to the very insanitary condition under which the boys live when they return to their homes from the Mission school at which they are resident.

C. M. W.

ANDREWS (Justin). **Incidence of Intestinal Protozoa with Special Reference to the Epidemiology of Amoebiasis in the Population of Fresnillo, Zacatecas, Mexico.**—*Amer. Jl. Hyg.* 1934. May. Vol. 19. No. 3. pp. 713–733. With 1 fig. [25 refs.]

During a survey of the inhabitants of Fresnillo, a small mining town situated 7,000 to 7,500 feet above sea level on a plateau in the State of Zacatecas, Mexico, the author found that of 2,302 inhabitants 76·9 per cent. were infected with one or more of the common intestinal protozoa. The native Mexicans were more commonly infected than the foreign residents, while of the latter those living in the vegetable garden district gave a higher incidence than others. As regards occupational groups the highest *E. histolytica* rate occurred amongst servants in foreign households, while of labourers those employed in the mines were more generally infected than those working above ground. It

appeared from an examination of the data collected that amoebic infection in foreign residents was derived primarily from the servants, who owed their high infection rate to the handling of raw vegetables which, according to local custom, had been subject to "freshening" with water which had every chance of being contaminated with human faeces. The infection incidence of the miners was due to the lack of satisfactory sanitary arrangements underground. The part played by the water supply, taken very largely from wells, was difficult to evaluate. It was clear, however, that during the rainy periods in summer there was opportunity for faecal material to be washed into the wells.

C. M. W.

SPECTOR (Bertha Kaplan) & BUKY (Florence).—**Viability of** *Endamoeba histolytica* **and** *Endamoeba coli*. **Effect of Drying.**—*Public Health Rep.* 1934. Mar. 23. Vol. 49. No. 12. pp. 379–385.

Employing the eosin test as an indication of viability, cysts staining with eosin being regarded as dead, the authors have found that cysts of *Entamoeba histolytica* or *E. coli* if smeared on the hands in faeces which are allowed to dry at room temperature die very rapidly. The number of cysts of *E. histolytica* to survive beyond 5 minutes was a very small proportion of those killed, while it was exceptional for any cyst to survive beyond 10 minutes. The fouling of the hands was intentionally far in excess of any that would be likely to occur under ordinary conditions.

C. M. W.

ANDREWS (Justin). **The Retention of** *Endamoeba histolytica* **Cysts under Finger-Nails.**—*Amer. Jl. Trop. Med.* 1934. Sept. Vol. 14. No. 5. pp. 439–441.

This contribution is relevant to the question as to the part played by food handlers in the transmission of amoebiasis.

SPECTOR and BUKY's (1934) experiments led them to state that in spite of conditions which "provided for a fouling of the hands far in excess of that which would be likely to occur under ordinary conditions, even with the most untidy or wilfully careless carrier . . . the number of cysts of *Endamoeba histolytica* to survive beyond five minutes was very small in proportion to those killed, and it was exceptional that any survived beyond ten minutes." The criterion of viability was alteration of cell wall permeability to a 1 : 1,000 aqueous solution of eosin. SPECTOR and BUKY's work was thus a demonstration of the unlikeliness of faecal contamination of fingers of food handlers playing any part in transmitting amoebiasis.

Dr. Andrews devised and carried out experiments, here reported, to determine viability of amoebae lodged under the finger nails. His results show that cysts of *E. histolytica* survive under finger nails, as judged by debatable criterion of stainability with eosin, for much longer than five minutes; that there is less chance of this occurring with short well-manicured nails than with long closely applied not well-manicured nails; and that ordinary hand washing with soap and warm water generally suffices, especially with short nails, to dispose of faecal material which might have lodged under the nails.

The period of time during which the cysts fail to take stain is great enough to permit contamination of cold moist foods or beverages.

H. M. H.

FAUST (Ernest Carroll) & KAGY (Edwin S.). **Studies on the Pathology of Amebic Enteritis in Dogs.**—*Amer. Jl. Trop. Med.* 1934. May. Vol. 14. No. 3. pp. 221–233. With 1 fig. [14 refs.]

The author describes three stages in the invasion by the amoeba of the gut of the untreated dog.

(1) Extensive superficial denudation of mucosa, similar to that in the kitten, except that the solitary lymph node in the dog is protected by epithelium and is not usually injured.

(2) Typical deep bottle-neck ulceration, unaccompanied by cellular infiltration.

(3) Chronic undermining ulceration, with superficial sloughing, frequently complicated by bacterial invasion.

The second and third types most nearly correspond to the human amoebic process.

In the dog, the caecum is the earliest site of amoebic attack ; but in more chronic cases the more evident, and often deeper, lesions are found in lower colon and rectum. The earliest superficial tissue changes, as well as the typical bottle neck ulcers, and the honeycombing destruction of submucosa, all indicate that lytic action is most important in development of the amoebic process, although mechanical action aids the amoebae in their penetration and migration. While bacteria, accompanying or following the amoebae, complicate the picture, there is adequate evidence that the amoebae alone are responsible for the typical lesion. Amoebae in uncomplicated cases provoke no polymorphonuclear leucocyte infiltration, but monocytes may invade the damaged area. The amoebae do not appreciably stimulate the solitary lymph nodes. Where bacteria accompany or follow the amoebae, there is profound leucocytic infiltration and lymph node response.

H. M. H.

MELENEY (Henry E.) & FRYE (William W.). **Studies of *Endamoeba histolytica* and Other Intestinal Protozoa in Tennessee. VII. The Histopathology of Intestinal Amoebiasis in the Kitten and in Man.**—*Amer. Jl. Hyg.* 1934. July. Vol. 20. No. 1. pp. 84–105. With 6 figs. [10 refs.]

This paper describes fully and illustrates the histological picture of amoebic infection of the colon as disclosed by examination of tissue from 120 kittens, and three human autopsies, performed shortly after death.

In the kittens, massive dilatation of submucosal lymph vessels containing necrotic débris, bacteria, and amoebae, was frequently found. Those autopsied several hours after death, and others at known intervals after death, showed only an occasional slight advance of amoebae into the unaltered tissues beyond the lesions.

The three human autopises showed all types of amoebic lesions, from shallow mucosal lesions to deep abscesses of submucosa. As compared with the kitten lesions, the human showed greater loss of epithelium in the bases of glands without necrosis of stroma or mucosa ; (2) less massive coagulation of mucosa ; (3) more undermining of mucosa by necrotic lesions in submucosa ; (4) extensive migration of amoebae into normal tissue, and the authors believe this migration to be primarily ante-mortem. *H. M. H.*

LEIVA (Lamberto). **A Fatal Case of Nondysenteric Amoebiasis.**—*Philippine Jl. Sci.* 1934. Feb. Vol. 53. No. 2. pp. 159–167. With 3 plates. [10 refs.]

Necropsy revealed abscess of the liver, lung, kidney, and brain. The intestines were normal, with no scars or ulcers, except in the caecum where " minute pinhead erosions " were visible, and smears from them revealed, microscopically, trophozoites and cysts of *E. histolytica.* In the walls of the abscesses in liver, lung, kidney, and brain, trophozoites of *E. histolytica* were demonstrated. *H. M. H.*

GIORDANO (Mario). Contributo alla terapia dell'amebiasi intestinale. [**The Treatment of Intestinal Amoebiasis.**]—*Arch. Ital. Sci. Med. Colon.* 1934. Sept. 1. Vol. 15. No. 9. pp. 706–720. English summary (5 lines).

The author records 30 cases of amoebic dysentery, that is, all were passing blood and mucus and in most of them the entamoeba was seen. Thirteen had previously been treated by emetine (some had had more than one course), stovarsol, or yatren without cure. They were then given Vioform (Iodo-oxyquinoline hydrochloride) Ciba, by mouth in doses of 0·75 gm. daily for 10 days, the course being repeated after an interval of 5–7 days. In no instance were any toxic symptoms produced, and the entamoebae disappeared. In two patients they were found again later, but both of these lived in unhygienic surroundings with every chance of reinfection. *H. H. S.*

FAUST (Ernest Carroll) & KAGY (Edwin S.). **Studies on the Effect of feeding Ventriculin, Liver Extract and Raw Liver to Dogs Experimentally Infected with** *Endamoeba histolytica.*—*Amer. Jl. Trop. Med.* 1934. May. Vol. 14. No. 3. pp. 235–255. With 1 fig.

Following on preliminary observations of the benefit of feeding raw liver to dogs infected with *E. histolytica* the authors undertook the further experiments here recorded.

The results of the experiments demonstrated that ventriculin was consistently harmful to the host, it did not check invasion of amoebae and it did reduce resistance of gut wall to bacterial invasion. Liver extract was beneficial to the host and appreciably arrested the amoebic process. Raw liver not only helped in arresting the amoebic process, but in some cases produced complete eradication of amoebae. Evidence gathered from these experiments suggests that efficacy of liver feedings consists not in stimulating haematopoietic organs, but by direct contact with tissues attacked by the amoebae. It is not amoebicidal but amoebostatic. Furthermore, the neutralizing effect of liver on histamin and other degeneration products of proteins in the bowel lumen, conceivably aids the healing process and reduces danger of bacterial invasion. *H. M. H.*

HOGUE (M. J.). **Further Studies on the Effect of Amoebicidal Drugs on Tissue Culture Cells (Arsenious Trithio Salicylic Acid, Carbarsone, Kurchi Bismuth Iodide, Proparsamide, Vioform).**—*Amer. Jl. Trop. Med.* 1934. Sept. Vol. 14. No. 5. pp. 443–456. With 6 figs.

The tissue cultures were of 8-day old chick embryo intestines (Locke-Lewis medium). The five drugs were found to affect the tissues differently. A.T.S. acid was very toxic to all the tissues grown in *vitro.* Carbarsone was not very injurious to tissues of digestive tract,

though epithelium was sometimes affected. Kurchi bismuth iodide in low dilutions kills all the tissue culture cells ; in higher dilutions it is injurious to fibroblasts but not to epithelium. Proparsamide is very injurious to sympathetic nerves and has little effect on other tissues. Vioform was very toxic to fibroblasts in all the dilutions tried, but the epithelial cells survived in its higher dilutions. Of the three arsenic compounds, carbarsone (28·85 per cent. arsenic content, valency 5) was least injurious to the tissue culture cells ; proparsamide (26 per cent. As. valency 5) affected only the nerves ; A.T.S. (13 per cent. As. valency 3) was the most injurious to all the cells. *H. M. H.*

DESCHIENS (R.). Influence du froid sur les formes végétatives de l'amibe dysentérique. [**Influence of Cold on the Vegetative Forms of** *E. histolytica*.]—*C. R. Soc. Biol.* 1934. Vol. 115. No. 8. pp. 793–795.

——. Méthode de culture, à des températures alternées, de l'amibe dysentérique. [**Cultivation of** *E. histolytica* **at Alternated Temperatures.**]—*Ibid.* No. 10. pp. 1072–1073.

Working with *Entamoeba histolytica* in cultures the author has found that the survival of the amoeba, as tested by subculture into fresh medium, increases with a fall in temperature. Thus, at 28°C. the survival was 5 days, at 18°C. 9 days and at 5°C. 11 days. The removal every 48 hours of the liquid portion of the medium and its replacement by liquid from fresh tubes increased the survival at 25°C. from 5 to 8 days. At 0°C. the time was only 56 hours.

In the second paper an account is given of a prolongation of the survival time by alternate exposure of the cultures to high and low temperatures. Thus, a culture after 48 hours incubation at 37°C. was exposed to 3°C. for 3 days, followed by 1 day at 37°C. and then again by 3 days at 3°C. and so on. The amoebae were still alive at the 18th or 19th day. *C. M. Wenyon.*

DESCHIENS (R.). Culture et enkystement de l'amibe dysentérique dans les eaux d'égout. [**Growth and Encystment of** *E. histolytica* **in Drainage Water.**]—*C. R. Soc. Biol.* 1934. Vol. 115. No. 7. pp. 701–704.

Experimenting with the possibility of cultivating *Entamoeba histolytica* in ordinary water the author has found that in certain cases, as, for instance, when the water has been enriched with material draining from slaughter houses, growth is possible if the temperature reaches a sufficiently high degree, as it may do in the tropics. Moreover under such conditions encystment of the amoeba may take place, for the author has found that this can be brought about by the addition of horse serum to the medium. It would seem possible, therefore, that in nature unencysted amoebae escaping from the intestine may survive and multiply for a while if they gain access to suitable water and finally encyst. *C. M. W.*

TSUCHIYA (H.). **Further Studies on the Cultivation of** *Endamoeba histolytica* **and a Complement Fixation Test for Amebiasis.**—*Jl. Lab. & Clin. Med.* 1934. Feb. Vol. 19. No. 5. pp. 495–504. [30 refs.]

For the cultivation of *E. histolytica* the author advocates the use of a broth to which is added for each test tube (8 cc. of broth) two 4 mm.

loopfuls of a sterile mixture of rice starch and animal charcoal in the proportion of 2 : 1. If this medium is inoculated with washed cysts of the amoeba a good growth is obtained. Sub-cultures are made every 48 hours either into the liquid medium alone or into the medium on the surface of a Dorsett's egg slant. It is claimed that other intestinal amoebae will not grow by this method. With amoebae thus cultivated an antigen was prepared by Craig's method. Of 153 persons whose sera were tested, 135 known to be free from amoebic infection gave a negative complement fixation test. Of the remainder 8 known carriers of *E. histolytica*, 5 cases diagnosed as clinical amoebic dysentery and 4 cases of ulcerative colitis without amoebae were positive, while 1 case of clinical amoebic dysentery was negative. *C. M. W.*

PAVLOFF (P.). Recherches sur la présence de kystes à quatre noyaux d'amibes dysentériques dans les selles des porcelets. (Note préliminaire.) **[Four-nucleated Cysts of the Dysentery Amoeba in the Faeces of Young Pigs.]**—*Ann. Parasit. Humaine et Comparée.* 1934. Sept. 1. Vol. 12. No. 5. pp. 394–395.

The paper records merely a negative result, namely the failure to discover four-nucleated cysts of the type of those of the dysentery amoeba in young pigs in France after more than 500 examinations. The examination was undertaken in view of KESSEL's statement that in China 30 per cent. of young pigs examined by him revealed such cysts. *C. M. W.*

BACILLARY DYSENTERY.

FEEMSTER (Roy F.). **Use of Bacteriophage in Diagnosis of Bacillary Dysentery.**—*Jl. Infect. Dis.* 1934. Sept.–Oct. Vol. 55. No. 2. pp. 190–194.

This is an interesting contribution to the laboratory diagnosis of dysentery. It is comparatively rare to be able to isolate the causative dysentery bacillus from a stool which has been sent to a laboratory. This was formerly ascribed to the small number of organisms present in mild cases and to their overgrowth by other bacteria. We have now to add another cause for the sterility of platings—the fact that, by the time the stool comes under examination, phage with its lytic and inhibitory action has made its appearance. "A stool sample . . . usually contains both the bacillus and the bacteriophage, and during the interval between the collection of the sample and its arrival at the laboratory the organisms are killed." The author has utilized an institutional outbreak of dysentery, of more than 100 cases and 18 deaths in a population of 1,750, to apply the dysentery phage test as a diagnostic procedure in addition to culture and serum-agglutination. The bacillus, of Y-Hiss type, was isolated only six times out of 90 stool examinations. Agglutination tests with stock cultures were positive in 36 out of 55 patients for blood samples taken 5 to 36 days after the onset of illness, while 17 patients out of 18 gave agglutination at 1–40, six months after the epidemic, with the culture isolated and still higher titres with stock cultures. The phage tests, which form the main subjects of this article, gave 29 positive determinations out of 81 stool examinations against the 6 out of 90 for bacillus culture. A very interesting table gives the positive results in this phage test week by week. It shows this to have been for the 1st, 2nd, 3rd and 4th week

2 out of 6, 8 out of 10, 5 out of 11, and 2 out of 14. Six months after the epidemic the phage had disappeared from the stools. The technique is as follows :—

(1) Cover 1 to 2 gm. faeces with 10–20 cc. nutrient broth. (2) Allow to remain in contact 30 min. or longer to allow phage to diffuse. (3) Decant the broth carefully and filter through a Berkefeld candle. (4) Place 0·5 cc. filtrate and 0·05 cc. 18-hr. broth culture of the causal organism in a tube of broth. (5) Set up a control tube with no filtrate. (6) Examine tubes after 24, 48 and 72 hrs. for clearing by phage action. (7) Test any doubtful tubes by the method of plating out with a 24-hr. broth culture to obtain plaques.

Of course, in cases where the causal organism has not been isolated, it will be necessary to set up the filtrate against a number of organisms of the dysentery group or, if the disease is not clinically dysentery, with other organisms, such as those of the Salmonella group. " The length of the series will depend on the clinical picture." [The specificity of the phage does not seem to have been actually investigated.] *W. F. Harvey.*

McClean (S. D.) & Marsh (Frank). **Bacillary Dysentery due to Flexner, Type " Z " presenting Some Unusual Features.**—*Lancet.* 1934. Sept. 8. pp. 545–546.

The authors describe a case of dysentery in which " at no time was the classic picture of blood, pus, mucus and epithelial cells presented by the stools." The stool was consistently diarrhoeic. Dysentery bacilli of " Z " type were easily isolated and gave characteristic agglutination with Medical Research Council standard sera, while the patient's serum also gave typical agglutination of standard agglutinable type culture " Z." It is thought that the absence of mucus in the stools may have accounted for the ease of isolation of the causal bacterium. *W. F. Harvey.*

Reid (P. E.), Anderson (M. X.), Stubblefield (H. I.) & Ivy (A. C.). **Protective Action of Sodium Thiocyanate against Dysentery Toxin (Shiga). An Experimental Study in Dogs and Rabbits.**—*Jl. Infect. Dis.* 1934. July–Aug. Vol. 55. No. 1. pp. 112–122.

It was discovered by accident that a 4 to 5 weeks previous injection of sodium thiocyanate in dogs appeared to protect them against lethal doses of the toxic filtrate from a Shiga dysentery culture. The matter was investigated further and it was found that there was a definite protection to dogs afforded by 60 mgm. sodium thiocyanate orally or 20 mgm. intravenously. This protection, however, was not manifest in rabbits. Now it is known that sodium thiocyanate itself is relatively non-toxic, but that it is only slowly eliminated and therefore tends to accumulate when it is administered continuously. A mechanism for the action of the thiocyanate has been sought in the claim that it tends to prevent coagulation of proteins or to render them more " soluble." Some such preventive action may come into play to protect the colloidal cytoplasm of cells from the dysentery toxin. The authors, however, prefer to offer no explanation of the action, but they suggest the possibility of thiocyanate as a therapeutic agent in human Shiga dysentery. It " may prove to be effective prophylactically . . . may also be of benefit if given early in the disease," but is not likely to be of

use "if given during collapse or after extensive bloody diarrhoea." The dosage suggested is, "as a prophylactic measure . . . the daily oral administration of 20 mgm. . . . per kilogram . . . of body weight in broken doses for three days. . . . This should afford protection against a lethal dose of dysentery toxin for at least a month."

W. F. Harvey.

MURASHIMA (Tetsuo). **Instances corroborating the Efficacy of Oral Vaccination against Dysentery and** *Yekiri.—Jl. Public Health Assoc. Japan.* 1934. July. Vol. 10. No. 7. pp. 1–7.

[Many of the statistics presented as showing efficacy of a prophylactic vaccine are not comparable in respect of the vaccinated and the non-vaccinated. The totals of the non-vaccinated who are "at risk" are not accurately known and in an epidemic the vaccine is often given after the disease has made its appearance and already taken its toll of susceptible individuals who may even be reckoned among the non-vaccinated.] In the instance given here the vaccine was administered some two months before a real water-borne and explosive epidemic of dysentery broke out. The vaccine was given orally, in tablet form and contained three strains of dysentery bacilli in equal portions. One of these strains seems to have been the causative organism in the epidemic, which in the course of 12 days attacked 39 households out of 65, 90 persons out of the entire population of 316, and 45 children of ages 2 to 14 years out of 95. Of the 45 children attacked 10 out of a total of 30 were vaccinated (33·3 per cent.) and 35 out of 65 were non-vaccinated (53·8 per cent.). The mortality figures were 1 out of 10 for the vaccinated and 5 out of 35 for the unvacccinated. *W. F. Harvey.*

MIXED AND UNCLASSED DYSENTERY.

LARGE (D. T. M.). **Dysentery among Troops in Quetta. Part I and Part II A ; B ; C.**—*Jl. Roy. Army Med. Corps.* 1934. Aug. & Sept. Vol. 63. Nos. 2 & 3. pp. 80–92. With 1 chart ; 157–167. With 1 chart. [9 refs.]

—— & SANKARAN (O. K.). **Dysentery among Troops in Quetta. Part II D ; E.**—*Ibid.* Oct. & Nov. Nos. 4 & 5. pp. 231–237. [4 refs] ; 303–312. [3 refs.]

An epidemiological and laboratory case-survey.

During 1932 and 1933, the number of cases examined in the laboratory was 1,536, of which 63 per cent. were bacillary, the remainder amoebic (166 cases *E. histolytica*), or of indefinite nature. A dysentery bacillus was isolated in 70 per cent. of the bacillary cases, the other 30 per cent. were classed on microscopic examination of the exudate. Of the cases showing a dysentery bacillus, Flexner group accounted for 63·5 per cent. ; Sonne 14·0 ; Shiga 10·4 ; para Shiga 3·0 ; Schmitz 5·6 ; para Schmitz 2·0.

Dysentery in Quetta is characterized by two annual increases, May–June, and August–September, with a marked lull in July, the increases preceded by a period during which potentially irritant particles of silica are washed in excess into the water supply by rain ; and frequent dust-raising winds occur.

The usual close relationship between humidity and flies, and flies and dysentery exists. Infection of troops probably also occurred through the medium of missed cases who had contracted infection in the insanitary and fly infested bazaar ; and also of missed cases among children and Indian servants.

Bact. dysenteriae Sonne was prevalent in the spring months only, *Bact. dysenteriae* Shiga in the autumn. The better known types of Flexner bacilli are scarce in spring but predominate in autumn. This may have a bearing on vaccine prophylaxis of dysentery. *H. M. H.*

WEINBERGER (Herbert L.). **Dysentery. Report of Three Cases in One Family due to Atypical** *Bacillus dysenteriae* **and** *Endamoeba histolytica.*—*Jl. Amer. Med. Assoc.* 1934. Mar. 24. Vol. 102. No. 12. pp. 916–917.

These three cases were all associated with high fever, leucocytosis, prostration, and signs and symptoms of an acute condition of the abdomen. This is unusual in amoebiasis alone, and is probably due to an associated infection with one or other of the bacillary dysentery group. This proved to be true. In all three cases *Bact. dysenteriae* (Schorer and Duval 1904) was isolated 60 days before discovery of *E. histolytica*. Combination treatment by emetine and chiniofon proved effective against the amoebiasis. *H. M. H.*

BONNE (W. M.). Rivanol bij dysenterie. [**Rivanol in Dysentery.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. Aug. 14. Vol. 74. No. 17. pp. 1065–1080. English summary.

Parallel series of cases were treated, the one with the ordinary medicaments and the other with rivanol. This was done for both amoebic and bacillary dysentery.

In the series of amoebic dysentery patients, in which characteristic motile amoebae carrying erythrocytes were found, twenty were treated with magnesium sulphate on the first day followed by 50 mgm. rivanol three times a day, while another twenty were treated from their first day for 5 days with 30 mgm. emetine and 1 gm. yatren three times a day by deep subcutaneous injection and *per os* respectively. These cases are compared for a variety of characters. In both, blood and mucus disappeared from the stools by the 6th day with 7 exceptions in the case of rivanol and 3 in the case of emetine-yatren. The general condition of the patient treated with rivanol sometimes gave rise to anxiety on the 6th day but not so with emetine-yatren. After the use of emetine-yatren erythrocyte-containing amoebae were never found in the stools on the 5th or 6th day, whilst for these days with rivanol 9 cases still showed amoebae. In the rivanol series one fatal case occurred. The conclusion is drawn that rivanol is unsuitable for amoebic dysentery in the doses used.

A further series was investigated of cases of bacillary dysentery type Y, and dysentery without known cause. They were all cases with blood and mucus in the stools and no amoebae. Series I contained 5 cases treated with bismuth and opium and 25 cases with yatren preceded by a laxative dose of magnesium sulphate. Series II, of 30 cases, were treated with rivanol preceded by magnesium sulphate and series III, also of 30 cases, were treated with magnesium sulphate only.

It was found that the treatment with magnesium sulphate alone gave quite satisfactory results and that these were less satisfactory with rivanol. The treatment with yatren, 1 gm. three times daily by the mouth, gave the best results. *W. F. Harvey.*

BYCHOWSKY (Arieh). **Lamblia and Trichomonas Enteritis and its Relation to Amoebic Dysentery.**—*Jl. Egyptian Med. Assoc.* 1933. Dec. Vol. 16. No. 12. pp. 1132–1141. [11 refs.]

Though flagellate infections of the intestine are very common in Egypt in persons suffering from various forms of enteritis, there is little evidence that they are actually pathogenic, for a careful examination will nearly always reveal an amoebic infection to account for the symptoms present.

C. M. Wenyon.

LAUDA (E.). Zur Therapie der Lamblienenteritis. [**Treatment of Lamblial Enteritis.**]—*Wien. Klin. Woch.* 1934. Sept. 21. Vol. 47. No. 38. pp. 1132–1133.

A patient 33 years of age with symptoms of enterocolitis was found to have a very heavy lamblia infection. By duodenal sound 0·3 gm. of neosalvarsan in 200 cc. of water was introduced into the duodenum. The diarrhoea immediately ceased and by the third day no lamblia could be found in the stools. The patient seemed to have recovered, nevertheless the parasites reappeared in spite of treatment with spirocid. The treatment was repeated. It again brought about the disappearance of the parasites which this time did not reappear. The author argues in favour of the pathogenicity of this flagellate. *C. M. W.*

GROSS (M.). Die Lambliase im Kindesalter. [**Giardiasis in Children.**]—*Schweiz. Med. Woch.* 1934. June 16. No. 24. pp. 551–554.

Writing of lamblia infections in children in Bern the author takes it for granted that the flagellate is pathogenic and ascribes to it the various symptoms which his cases exhibited—chronic diarrhoea, loss of appetite and the troubles consequent on these. Treatment was carried out by injections of myosalvarsan (sulfarsenol) as in syphilis or better by oral administration of spirocid (stovarsol). Rapid improvement with disappearance of parasites from the stools followed and if relapse occurred the illness was not so severe as it had been in the first instance. *C. M. W.*

LIDDO (Salvatore). Anomalie delle cisti di "Lamblia intestinalis." [**Anomalies of Cysts of** *G. intestinalis.*]—*Pathologica.* 1934. Sept. 15. Vol. 26. No. 515. pp. 607–608. English summary (4 lines).

In a case of lamblia infection the author has seen abnormally large cysts up to 17·5 μ in length. He thinks it possible that man may harbour more than one species of this flagellate. *C. M. W.*

ANDERSON (Hamilton H.) & REED (Alfred C.). Carbarsone Rectally in Amebiasis.—*Amer. Jl. Trop. Med.* 1934. May. Vol. 14. No. 3. pp. 257–267.

ANDERSON (Hamilton H.) & REED (Alfred C.). Untoward Effects of Anti-Amebic Drugs.—*Amer. Jl. Trop. Med.* 1934. May. Vol. 14. No. 3. pp. 269–281. With 1 fig. [16 refs.]

AZMY (Soliman) & TAHA (S.). The Treatment of Amoebiasis by Iodo-Chlor-Hydroxyl-Quinoline (Empero-Vioform).—*Jl. Egyptian Med. Assoc.* 1934. Oct. Vol. 17. No. 10. pp. 809–814.

BONNE (W. M.). Bacillaire dysenterie type Y.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. July 31. Vol. 74. No. 16. pp. 982–996. With 2 charts & 6 figs. on 2 plates. English summary.

CALLENDER (G. R.). The Differential Pathology of Dysentery.—*Amer. Jl. Trop. Med.* 1934. May. Vol. 14. No. 3. pp. 207–220. With 4 figs.

CASTEX (M. R.) & GREENWAY (Daniel). Influencia del tratamiento especifico, sobre una cepa de *Entamoeba histolytica.*—Reprinted from *Bol. Acad. Nac. Med. Buenos Aires.* 1930. Nov. 21. 8 pp. With 8 figs.

CASTEX (Mariano R.) & GREENWAY (Daniel). Consideraciones parasitológicas y clínicas sobre 2700 casos de amebiasis intestinal.—*Prensa Méd. Argentina.* 1934. Oct. 31. Vol. 21. No. 44. pp. 2049–2070. With 2 maps. [122 refs.]

CHANG (C.) & ROBERTSON (D. S.). Amoebic Liver Abscess in Manchuria with Special Reference to Intraperitoneal Rupture.—*Chinese Med. Jl.* 1934. Apr. Vol. 48. No. 4. pp. 375–380. [10 refs.]

CHOPRA (R. N.). The Toxic Effects of Emetine.—*Indian Med. Gaz.* 1934. June. Vol. 69. No. 6. pp. 309–312.

CHOPRA (R. N.) & SEN (S.). Carbarsone in Intestinal Amoebiasis. Part II.—*Indian Med. Gaz.* 1934. July. Vol. 69. No. 7. pp. 375–380.

CRAIG (Charles F.). Clinical Aspects of Amebiasis.—*New Orleans Med. & Surg. Jl.* 1934. Mar. Vol. 86. No. 8. pp. 609–613.

CRAIG (Charles F.). The Epidemiology of Amebiasis. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 6. Vol. 103. No. 14. pp. 1061–1063.

CREAGH (E. P. N.). Report on a Case of Hepatic Abscess with Spontaneous Evacuation through the Right Lung and Bronchial Tree.—*Jl. Roy. Army Med. Corps.* 1934. Sept. Vol. 63. No. 3. pp. 186–190. With 2 figs. & 1 chart.

DUVAL (Charles W.). Etiology and Pathology of Baciliary Dysentery.—*New Orleans Med. & Surg. Jl.* 1934. Mar. Vol. 86. No. 8. pp. 599–601.

EARNSHAW (P. A.). The Raw Apple Diet in the Treatment of Dysentery.—*Med. Jl. Australia.* 1934. Sept. 8. 21st Year. Vol. 2. No. 10. pp. 305–310. [16 refs.]

FAUST (Ernest Carroll). The Distribution and Diagnosis of Amebic Enteritis in the Southern United States.—*New Orleans Med. & Surg. Jl.* 1934. Mar. Vol. 86. No. 9. pp. 605–609. [39 refs.]

FRADKIN (William Z.). A Simple Sigmoidoscopic Aspirator.—*Jl. Amer. Med. Assoc.* 1934. July 7. Vol. 103. No. 1. p. 21. With 1 fig.

FREUND (Hugo A.). Amebic Abscess of the Liver. Report of Cases without Previous Manifestations of Amebiasis.—*Jl. Amer. Med. Assoc.* 1934. May 12. Vol. 102. No. 19. pp. 1550–1552.

HEMENWAY (Ruth V.). Results of the de Rivas Treatment in Dysentery Cases.—*Chinese Med. Jl.* 1934. Apr. Vol. 48. No. 4. pp. 337–341.

JAMESSON. Bacteriophage in Treatment of Dysentery.—*Jl. Indian Med. Assoc.* 1934. June. Vol. 3. No. 10. pp. 425–426.

KRAMER (Henry F.). Medical Aspects of Amebiasis.—*Med. Times & Long Island Med. Jl.* 1934. May. Vol. 62. No. 5. pp. 141–142. [14 refs.]

LYNCH (Kenneth M.). Prolonged Influences and Complications of Intestinal Amebiasis. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 13. Vol. 103. No. 15. pp. 1147–1150.

MCCAY (F. H.). The Treatment of Bacillary Dysentery with Bacteriophage.—*South African Med. Jl.* 1934. Oct. 13. Vol. 8. No. 19. pp. 721–730. [34 refs.]

MCCOY (G. W.) & CHESLEY (A. J.). Control of Amebic Dysentery. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 13. Vol. 103. No. 15. pp. 1145–1147.

MAGATH (Thomas B.). The Laboratory Diagnosis of Amebiasis. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 20. Vol. 103. No. 16. pp. 1218–1224. [16 refs.]

MALOWITSCHKO (Eugenie) & PUPENKO (I. G.). Ein Fall von Amöbenansteckung der menschlichen Unterkieferdrüse.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Jan. Vol. 38. No. 1. pp. 28–31. With 3 figs.

MARINO (A. W. Martin). Surgical Considerations in Amebiasis and Report of a Case.—*Med. Times & Long Island Med. Jl.* 1934. May. Vol. 62. No. 5. pp. 143–144. With 3 figs.

MELENEY (Henry E.). The Pathology of Amebiasis. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 20. Vol. 103. No. 16. pp. 1213–1218. With 11 figs.

OLIVER (Wade W.). Certain Laboratory Aspects of Amebic Dysentery Infection. —*Med. Times & Long Island Med. Jl.* 1934. May. Vol. 62. No. 5. pp. 145, 158–9.

PELLÉ (A.) & TANNOU. Pneumopathie et myosite amibiennes.—*Bull. et. Mém. Soc. Méd. Hôpit. de Paris.* 1934. May 21. 50th Year. 3rd Ser. No. 16. pp. 687–691. With 2 figs. & 1 chart.

PEÑA (V.). Emetinoterapia en la amibiasis de los niños.—*Gac. Med. de Caracas.* 1934. July 31. Vol. 41. No. 14. pp. 221–223.

REED (Alfred C.). The Treatment of Amebiasis. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 20. Vol. 103. No. 16. pp. 1224–1228. [44 refs.]

REED (Alfred C.). Bacillary Dysentery in California.—*Amer. Jl. Med. Sci.* 1934. June. Vol. 187. No. 6. pp. 819–826. With 1 chart.

SILVERMAN (Daniel N.). Clinical Features of Bacillary Dysentery.—*New Orleans Med. & Surg. Jl.* 1934. Mar. Vol. 86. No. 9. pp. 601–605. [11 refs.]

SILVERMAN (Daniel N.). Endemic Dysenteric Infections in Louisiana.—*New Orleans Med. & Surg. Jl.* 1934. June. Vol. 86. No. 12. pp. 786–789.

SIMON (Sidney K.). The Clinical Diagnosis of Amebiasis. Clinical Lecture at Cleveland Session.—*Jl. Amer. Med. Assoc.* 1934. Oct. 6. Vol. 103. No. 14. pp. 1063–1066.

BLACKWATER FEVER.

i. STEPHENS (J. W. W.). **The Distribution of Blackwater Fever (Summary).**—*Ann. Trop. Med. & Parasit.* 1934. Mar. 29. Vol. 28. No. 1. pp. 37–40.

ii. ——. **The Distribution of Blackwater Fever in Central America, South America and the West Indies.**—*Ibid.* 1933. July 7. Vol. 27. No. 2. pp. 283–307. With 2 maps. [3 pages of refs.]

i. Stephens gives here a brief summary of his seven previous papers on the distribution of blackwater fever. He considers that it is impossible to give any comparative figures indicating the frequency of the disease in the countries and localities named. He has, however, marked with an asterisk those places where blackwater fever is not an unusual condition. It is impossible to give an adequate summary of this short and valuable paper which itself is a very brief summary of the result of the author's prolonged researches on the geographical distribution of blackwater fever. It must be consulted in the original by those interested.

ii. This paper consists entirely of a series of tables giving details of the distribution of blackwater in the areas mentioned in the title, and must be consulted in the original by those interested. *W. Yorke.*

i. NAUMANN (H. E.). Betrachtungen zum Schwarzwasserfieber. [**Meditations in Blackwater Fever.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. June. Vol. 37. No. 6. pp. 299–307.

ii. ——. Schluss zu "Betrachtungen zum Schwarzwasserfieber." (Aus: Arch. Schiffs- u. Tropenhyg., Bd. 37, S.299.)—*Ibid* 1934. Apr. Vol. 38. No. 4. pp. 171–174.

i. The author believes that two important factors in the genesis of blackwater fever are malaria and liver damage.

In support of his second contention he lays stress on the fact that blackwater fever is rarely seen in young children.* He points out that children suffering from malaria are not brought for treatment until they have had fever for some time, and that when so brought they are slightly icteric, very anaemic and vomiting frequently; nevertheless, such children respond quickly to quinine treatment and do not develop blackwater fever. It follows that neither malaria nor destruction of red corpuscles suffices to explain the onset of blackwater; there must be another factor.

With the object of discovering what this is the author has made a careful study of the history and clinical findings disclosed by his cases of blackwater fever. Details are given of a series of 15 cases in Haiti. He lays particular stress on the history of Case 11. The patient was a young man, aged 27, who in 1929–1930 was treated by the author for severe tropical malaria. He recovered completely and since had had no fever and had taken no prophylactic measure. Owing to the depressed condition of trade he could not find enough work to occupy him and sought solace for some months in drinking a bottle of rum nightly. This resulted in severe liver trouble. He then developed malaria and

*This is not the experience of GIGLIOLI who on the Demerara River found children to be three times as liable to blackwater as adults. Twenty-four cases out of 63 were in children under ten years [*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Vol. 26. p. 204.]

the liver was found to be greatly enlarged. The malaria was treated with plasmochin compound and blackwater supervened. Ultimately the patient recovered. The author comments on the fact that the first attack of malaria was readily cured without mishap, but that the next attack which occurred after alcohol excesses resulted in blackwater. The patient, after his attack of blackwater, gave up alcohol, and although some months later he had another attack of malaria this was dealt with satisfactorily without any trace of blackwater.

As a result of analysis of his cases Naumann believes that blackwater fever occurs in malaria patients in whom the liver is damaged; and that the two chief causes of this are stasis and alcoholic abuse.

In an addendum details are given of two malaria patients who developed blackwater although the only treatment they received was a mixture of atebrin and plasmochin.

ii. In this paper the author considers the question of the proper treatment of blackwater fever. He recalls that the main cause of death in the fatal cases of the series described in his previous paper was heart failure following anaemia. [Four of the 15 cases ended fatally.] He asks whether it is possible to prevent or anticipate the destruction of red cells, or whether it is possible to cause a quick regeneration of red cells, thus mitigating the evil consequences of the anaemia. In view of the results obtained by the author with campolon in paroxysmal haemoglobinuria, it was decided to give this drug a trial in blackwater fever. The exact treatment given to a patient was as follows :—

The malaria was treated with 0·1 gm. of atebrin and 0·02 gm. of plasmochin twice or thrice daily; (the author remarks that he prefers atebrin alone at first as it upsets the stomach less than plasmochin); glucose and insulin; and campolon 1 to 2 ampoules daily. The results were excellent; the urine cleared by the fourth day and the blood haemoglobin had risen from 23 per cent. to 65 per cent. after 10 injections of campolon.

The question then arose whether this good result was due to atebrin or to campolon. Shortly afterwards an epidemic of malaria occurred and during this 41 cases developed blackwater fever. Of these, 18 were treated as above and all did well; the remaining 23 were treated by other doctors and 7 died. In all the blackwater cases malaria parasites were found. In this great epidemic of malaria it was common to find 4 to 7 cases in one family and yet only one of these would develop blackwater fever. Naumann, as the result of his enquiries into this matter, reached the general conclusion that all the robust individuals escaped blackwater and that this disease only occurred amongst those of feeble constitution.

The author's 18 cases of blackwater either came to him with the disease or it developed within 3 days of their coming to him for malaria. The only treatment given was atebrin. It follows, therefore, that atebrin does not prevent the development of blackwater; nevertheless, in the author's opinion, it is the best drug to use in blackwater, because, of the malaria remedies, it has the least damaging effect on the red cells and the whole organism.

Therapy to support liver function is important, so as to render the liver capable of dealing with the enormous number of destroyed red cells and of converting the haemoglobin into bile, thereby saving the kidneys and preventing suppression of urine through blocking of the uriniferous tubules. The part played by campolon is that it causes

quick regeneration of the red blood corpuscles and also stimulates the whole organism.* *W. Y.*

HALL (G. Rome). **Comments on Blackwater Fever, and a Group of Special Cases.**—*Jl. Trop. Med. & Hyg.* 1934. Feb. 1. Vol. 37. No. 3. pp. 33–36.

Very brief details are given concerning a group of blackwater cases which occurred at the Bibiani Mine, Gold Coast. With the exception of one patient they were all working in the Extractor House, where the last stages of the extraction of gold takes place. The great bulk of the paper is highly speculative and should be consulted by those interested in the original, as the reviewer is unable to make anything of it. In fact, there seems little evidence that many of the cases which occurred amongst the native staff were really blackwater. It may be of significance that it is stated that each of these patients suffered from haematuria, but, on the other hand, it may equally well be of no significance beyond the fact that the author fails to distinguish this from haemoglobinuria.† *W. Y.*

AMY (A. C.). **Haemoglobinuria : a New Problem on the Indian Frontier.**—*Jl. Roy. Army Med. Corps.* 1934. Mar., Apr., May. Vol. 62. Nos. 3, 4 & 5. pp. 178–191 ; 269–278 ; 318–329. [48 refs.]

These papers deal with a recent and hitherto unknown phenomenon on the Indian frontier, viz., haemoglobinuria in some way associated with malaria and confined to Indian troops and followers. So far there are records of 10 cases with 6 deaths.

The geographical distribution of the cases is limited to the frontier and the stations in which they occurred are mentioned. Up to date, no case of blackwater fever in India has been reported west of longitude 75° (Amritsar). The nearest point to that in the present series is longitude 71·5° (Kohat), which is 250 miles from Amritsar. The author, moreover, emphasizes that the Punjab is not recognized as a blackwater fever area. Five of the present series of cases were isolated, and five—in Quetta—were grouped both as regards time and place.

Details are given regarding the race, caste, age and occupation of the patients. It is stated that the fact that all the patients were Indians " is dead against a blackwater fever hypothesis." Malignant tertian parasites were found in four cases, simple tertian in five, and no parasites in one case.

The author next proceeds to consider what he calls " the burning question in this series of cases." Prior to the development of haemoglobinuria, the total amounts of quinine taken were :—

*Campolon (a Bayer product) is described as " a specially fractionated extract of liver of high therapeutic potency." It is given intramuscularly, 2 cc. equalling 500 gm. of fresh liver by mouth.—ED.

†The author states that AsH_3 was possibly present in the fumes in the final stage of gold extraction. Among the symptoms of AsH_3 poisoning mentioned by LEGGE ("Industrial Maladies." 1934. Oxford. Med. Publ. p. 90) are vomiting, jaundice, and haemoglobinuria or haematuria with strangury.—ED.

1 patient	32 grains	spread	evenly	over	$3\frac{1}{2}$	days (followed by atebrin)
1 ,,	50	,,	,,	,,	$2\frac{1}{2}$	,,
2 patients	90	,,	,,	,,	3	,,
1 patient	90	,,	,,	,,	$4\frac{1}{2}$	,,
1 ,,	110	,,	,,	,,	$5\frac{1}{2}$	,,
1 ,,	120	,,	,,	,,	6	,,

Three patients had taken no quinine; two of them died and in one the disease was very mild.

Prior to the onset of haemoglobinuria the amounts of atebrin taken were :—

1 patient	1·5 gm.,	spread	evenly	over	5	days.
1 ,,	1·8	,,	,,	,,	6	,,
1 ,,	2·1	,,	,,	,,	7	,,
1 ,,	1·2	,,	,,	,,	4	,, (preceded by quinine)

Prior to the onset of haemoglobinuria the amounts of plasmoquine taken were :—

4 patients	0·06 gm.,	spread	evenly	over	2	days.
1 patient	0·06	,,	,,	,,	3	,,
1 ,,	0·08	,,	,,	,,	2	,,
1 ,,	0·09	,,	,,	,,	$4\frac{1}{2}$	,,
1 ,,	0·10	,,	,,	,,	$3\frac{1}{2}$	,,
1 ,,	0·13	,,	,,	,,	$4\frac{1}{2}$	,,
1 ,,	0·18	,,	,,	,,	6	,,

Before the attack of haemoglobinuria set in, 6 patients therefore were on quinine, 3 on atebrin, 1 on quinine followed by atebrin, and all of them received plasmoquine. Attention is drawn to the comparatively small doses (daily and total) of each of these drugs. The author adds, however, "It is reasonably certain that some of the patients may have suffered from plasmoquine toxicity." He quotes from the literature to the effect that whereas quinine cannot safely be given to cases of blackwater fever because of the danger of producing further haemolysis, plasmoquine can be safely used at any stage of the disease. A summary of the signs of plasmoquine poisoning is given in this *Bulletin*, Vol. 30, pp. 195–6, and Amy draws attention to the close resemblance between this condition and blackwater fever. As regards plasmoquine dosage, SINTON states that doses as high as 0·2 and 0·32 gm. daily have been given, and FLETCHER quotes 0·18 gm. as not infrequent and 0·1 gm. as common. In contrast it is emphasized that in the present series the greatest amount taken was 0·18 gm. and that this was spread over 6 days. Judging from the literature it would seem that a daily dose of 0·03 gm. of plasmoquine is reasonably safe, but that even this small dose has been known to produce haemoglobinuria. Up to August, 1933, the standard dose throughout the army in India was 0·03 gm. daily; in the case of British troops mild toxicity was occasionally noticed, but severe poisoning has never been reported. There is some evidence that plasmoquine has a cumulative effect. In the case of Indian troops, and as a direct result of the Quetta cases of haemoglobinuria, the standard dose has been halved since August, 1933, and no further instances of haemoglobinuria have been reported.

In the second paper the author considers some of the points in which his series of cases so strikingly resemble blackwater fever. Having briefly summarized the chief features of blackwater fever he passes to a consideration of the manifestations of plasmoquine poisoning. These are practically speaking indistinguishable except that :—(1) Oxyhaemoglobinaemia, with oxyhaemoglobinuria, is never a result

of plasmoquine poisoning, but does occur in blackwater; and (2) so-called cyanosis is a feature of poisoning, but is not met with in blackwater fever.

Amy writes :—

" When it is noted that a patient is suffering from oxyhaemoglobinuria, and that cyanosis is not present, it is clear that—in the present state of our knowledge—a diagnosis of blackwater fever is preferable to one of plasmoquine poisoning.

" On the other hand, when the guide-posts are methaemoglobinuria and cyanosis, plasmoquine toxicity suggests itself, to the exclusion of blackwater fever."

The remainder of this paper consists of clinical details of the 5 isolated cases of the series; and the last paper gives information regarding the 5 cases which occurred at the big headquarters station at Quetta, " where there are well qualified specialists and an excellent laboratory at the call of the ward medical officers."

With reference to the two diagnostic points mentioned above, Amy states that it is, of course, very desirable to determine spectroscopically which form of haemoglobinaemia was present. There is apparently no satisfactory evidence. In the description of Case 4 of the Quetta patients, we read :—

" Unfortunately, at Quetta there is no spectroscope.* Methaemoglobinaemia was presumed on the dark grey colour of the blood (it was impossible to match the specimens with the standard colours of the Tallquist haemoglobinometer); and methaemoglobinuria on the ' stout ' as opposed to the port-wine colour of the urine. But for this, we have here a fairly complete and convincing picture, the outstanding features of which seem to be :—

" Sudden onset and dramatic swiftness of the attack.

" Rapid and massive destruction of the red blood cells.

" Methaemoglobinaemia, methaemoglobinuria and anuria.

" An attack out of all proportion to the amount of plasmoquine given; and a fatal issue despite the early withdrawal of the drug. Was the drug responsible ? "

In the protocols of the Peshawar case we read :—" Urine, oxyhaemoglobin by the spectroscope + "; and in those of the first Kohat case " urine, spectroscopically, oxyhaemoglobin; presence of methaemoglobin doubtful," and 4 days later " spectroscopic bands of oxyhaemoglobin persist; with a suspicion of methaemoglobin." The only reference to the point at issue in the second Kohat case is that the urine " is markedly haemoglobinuric (port wine) in character."

With reference to the second diagnostic point, viz., cyanosis, the author states that although it may be difficult to detect in Indians when it is of mild degree, it is quite easy to recognize when severe as was the case in the Quetta patients.

[The reviewer has examined these papers with great care and has failed to discover any reason why the cases should be regarded as other than ordinary blackwater fever. The papers are lengthy and the introduction of numerous quotations and extracts from the writings of others makes it very difficult to follow the author's argument. Apparently the points against blackwater are :—(1) The patients are all Indian, (2) they had methaemoglobinaemia and methaemoglobinuria, and (3) they were cyanotic. As regards the first point much more must be known before we can attach any weight to the argument; no

*Similarly for Fort Sandeman and Wana. There are spectroscopes at Peshawar and Kohat.

evidence is produced that the patients did exhibit methaemoglobin to the exclusion of oxyhaemoglobin; and the third point does not seem to be very weighty. It is, of course, possible that plasmoquine was the factor which precipitated an attack of blackwater fever in these cases, but even this is doubtful because six of them had quinine as well as plasmoquine, three of them had atebrin, and one both quinine and atebrin]. *W. Y.*

HASSELMANN (C. M.). **Blackwater Fever in the Philippine Islands.**—*Jl. Philippine Islands Med. Assoc.* 1934. Jan. Vol. 14. No. 1. pp. 18–24. [12 refs.]

After drawing attention to the fact that the prevalence of blackwater fever is most unequal in different malarious countries, the author states that in the Philippine Archipelago and in most other parts of Malaysia the disease is rare and of a relatively mild nature.

He reports in detail a case of blackwater in a Japanese who resided for about 10 years in the Philippines and had never previously been sick.

The following summary is given :—

" 1. Blackwater fever as a sequel to malaria is rare in the Philippine Islands.

" 2. Only a single case, the report on which contains sufficient detailed data to establish the diagnosis beyond any doubt, had been reported previously.

" 3. A second case of subtertian malaria with blackwater fever is presented, and its epidemiology, parasitology, clinical symptomatology, and therapy are briefly discussed.

" 4. Several other cases are reported in the literature in which, however, the given data are not sufficient to establish their authenticity.

" 5. The scanty loimological data on blackwater fever in the Philippines are cited and discussed." *W. Y.*

JOFE (Hillel). Contribution à la pathogénie et à la thérapeutique des fièvres hémoglobinuriques. [**Pathogenesis and Therapy of Blackwater Fever.**]—*Jl. Egyptian Med. Assoc.* 1933. Oct. Vol. 16. No. 10. pp. 1022–1026.

This paper consists of a general discussion of the pathogenesis of blackwater fever and contains little that is new.

The author remarks that among the very numerous cases of blackwater fever which he has encountered during almost 40 years of work in Palestine he has met with 3 patients who had not taken quinine before the onset. The first was the case of a boy admitted in a comatose state with a high temperature, with pronounced jaundice, and with haemoglobinuria; he died almost immediately. The other two cases occurred in patients suffering from chronic malaria who had been given methylene blue. It is stated that in almost all the cases in which information was available regarding quinine, the attack of blackwater commenced about 5 hours after the administration of the drug.

The distribution of blackwater corresponds in general with that of pronounced malaria, but it is not always the case; thus, the disease is rare in the Roman Campagna, in certain notoriously malarial districts

of Greece, in Morocco, in Algiers, in Tunis, in Egypt, etc. It follows, therefore, that besides malaria and quinine, other factors play a part.

The author observed numerous cases which recovered after an intramuscular or intravenous injection of a large dose of quinine, and mentions the contradictory statements which the literature contains on this subject. Most authors state that cold is one of the provocative factors in blackwater fever, but the author's observations do not confirm this. He gives the monthly distribution of 202 cases seen by him in Palestine. The greatest number of cases occurred in September and October, which are not cold months. Attention is drawn to the fact that different epidemics may exhibit marked differences in intensity and in mortality. The author then passes into a discussion of the question of haemolysis in general and of that in blackwater fever in particular. He refers particularly to the experiments of WIDAL, ABRAMI, and BRISSAUD on autolysins, and to the work of NOCHT and KESSLER on the haemolytic action of the organs of blackwater patients. As a result of his reflections, the author reaches the conclusion that the same factor (cold or quinine) acting for a little time may increase haemolysis, but if its action is more prolonged or more intense it may diminish or stop haemolysis. For this reason he has for many years commended the use of colloidal quinine (Collobiase de quinine Dausse) in the treatment of blackwater fever. Each ampoule contains 0·0025 gm. of quinine, and the author injects the contents of 3 or 4 ampoules every 2 hours. He claims that his results are excellent.

W. Y.

WAYL (P.). **Observation of Blackwater Fever in Galilee.**—*Folia Medicinae Internae Orientalia.* Jerusalem. 1933. May. Vol. 1. No. 2. pp. 195–199.

The author has analysed the histories of 13 cases of blackwater fever in Galilee and has drawn therefrom certain conclusions.

Of the 13 cases 10 came from the Huleh area and 3 from the Jordan valley; 8 of the patients were born in Palestine, 3 immigrated when young, and 2 had been in the country for 4½ years, when they first developed blackwater.

The author summarizes his conclusions as follows :—

"1. Blackwater fever is still a frequent disease in the Huleh area.

"2. The morbidity and mortality is larger among Sephardic than among Ashkenazic Jews.

"3. The single attack of blackwater brings no immunity—just the reverse was observed.

"4. The disease seems to prevail in certain families; be it owing to physiological reasons or to certain habits (indifference towards treatment of malaria).

"5. No termal repartition of blackwater fever was observed by us.

"6. At certain periods there is an increase of incidence, probably in connection with increase of malaria.

"7. In our experience quinine was the factor determining the onset of blackwater fever in the majority of our cases.

"8. A gradual administration of quinine to these patients does not prevent the blackwater fever.

"9. Quinine treatment is to be advised only in those cases of blackwater fever where malaria parasites are found.

"10. Blood transfusion, a new therapeutical procedure, seems to be quite safe, but is by no means a universal remedy." *W. Y.*

NÄGELSBACH (Eduard). Schwarzwasserfieber und Atebrin. [**Blackwater Fever and Atebrin.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 337–339.

An account is given of a case of malignant tertian malaria in which quinine provoked a slight attack of blackwater; atebrin cured the malaria infection and the haemoglobinuria quickly disappeared.

Atebrin has been shown to exert a powerfully parasiticidal action on the schizonts of *P. falciparum*, but whether it ever provokes an attack of blackwater is still an unanswered question.

The patient was a pregnant woman who arrived in hospital in the middle of the night. She had had a rigor during the morning and the blood contained numerous *P. falciparum*. She had not taken any quinine, as previously it had provoked an attack of blackwater. On admission labour had already commenced, but the pains were few and feeble. Atebrin 0·1 gm. was immediately given and a second tablet the next morning. The pains continued to be weak and it was decided to give an intravenous injection of solvochin (0·5 gm. of quinine HCl.). An hour later she passed black water. Some hours later thymophysin (10 units) was given, the pains increased and she was delivered of a healthy child. The urine cleared soon after parturition. On the same day, 5 hours after the appearance of blackwater, another tablet of atebrin was given, and 2½ tablets (0·25 gm.) on each of the 4 following days. There was no further fever and no more haemoglobinuria. *W. Y.*

MOIR (K. Tole). **Blackwater Fever following Atebrin.**—*West African Med. Jl.* 1934. Jan. Vol. 7. No. 3. pp. 121–123.

Records are given of two cases of blackwater fever following the administration of atebrin. The author considers the matter is of importance and should be generally known, the more especially because the manufacturers state that atebrin is "not contra-indicated in blackwater fever."

Case I. Veterinary officer, aged 31, took ill with fever on the 23.9.33. On Sept. 26th *P. falciparum* infection was diagnosed and a course of atebrin and plasmoquin simplex (3 tablets a day for 3 days) recommended. The patient had been in the habit of taking prophylactic quinine, 5 gr. daily, but discontinued this whilst taking atebrin. He suffered from marked abdominal symptoms and vomited. The next day he still felt bilious, so did not take the last of the atebrin plasmoquin tablets. On Oct. 3rd he felt well all day and played polo in the evening. Later, however, his temperature rose to 100°F. On Oct. 4th, as he was still feverish, he took 5 gr. of quinine about 8 a.m.; at 9.15 p.m. he had a rigor and passed black water later in the evening. The attack was a mild one.

Case 2. Veterinary officer, aged 26. This officer was sent to relieve the previous one when he fell ill. He also was in the habit of taking the daily prophylactic dose of quinine. He contracted subtertian malaria and was given the same course of atebrin and plasmoquin simplex as was the previous case, but, on the recommendation of his doctor, he continued his daily dose of 5 gr. whilst taking the atebrin. He completed the course of treatment on Nov. 3rd. The next morning he took his customary 5 gr. of quinine and felt well during the day, but in the evening had some malaise. He went to bed early and had a severe rigor about 10 p.m. and took 10 gr. quinine and 10 gr. of aspirin. About midnight he passed black water; this attack was also mild.

Discussing these cases, the author writes that it is obvious that the course of atebrin plasmoquine failed in two respects, viz. :—

"1. It did not prevent the onset of blackwater fever.

" 2. If one agrees with the hypothesis that blackwater fever is always a complication of malaria then a full course of atebrin with plasmoquin cannot have got rid of the malarial infection in these cases. This is borne out by the presence of parasites in the blood of Case 2.

" The questions suggested by these cases are as follows :—

" 1. Are they examples of failure of the specific action of atebrin, the drug being in good condition, or was the failure due to some other cause ?

" 2. Were the attacks of blackwater fever directly excited by the atebrin-plasmoquin taken ? "

It is difficult to answer the first question. There seems to be no evidence that the drug had undergone any deterioration, or that the patients had failed to take the course of treatment conscientiously and regularly. As regards the question whether the blackwater fever was directly excited by the atebrin-plasmoquine course, the author states that this can best be answered by considering first what other exciting cause there may have been. It might be argued that the resumption of the daily prophylactic quinine in Case 1 was the exciting factor, but such a conclusion is completely negatived by Case 2, in which the daily quinine was taken throughout the atebrin course. After considering all the circumstances, Moir writes " The fundamental conclusion remains that under certain circumstances, which cannot be defined, atebrin and plasmoquine is not only incapable of preventing blackwater fever, but will probably excite an attack." This conclusion, in Moir's opinion, is of the greatest importance and discredits the claim that atebrin is not contra-indicated in blackwater fever. He does not mean that atebrin is not a valuable drug in the treatment of malaria, but that it cannot be regarded as safe, and must be placed in the same category as quinine, and " given with the same degree of caution in subtertian malaria when a possibility of blackwater fever exists." [It would considerably assist the reviewer and doubtless many others if the author would let us know what exactly this last sentence means.]

W. Y.

PATERSON (James C.). **Note on the Use of Alkali Therapy in the Treatment of Blackwater Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May. 5. Vol. 26. No. 6. pp. 539–546.

Observations are recorded on a number of cases of blackwater fever from the interior of Colombia, some of which were treated by early injections of sodium bicarbonate. These observations were made because of the considerable difference of opinion regarding the value of the intravenous injection of sodium bicarbonate during the acute stage of blackwater fever expressed at a recent meeting of the Royal Society of Tropical Medicine and Hygiene [this *Bulletin*, Vol. 30, p. 518].

Each of the patients received treatment with sodium bicarbonate, but the method of administration varied in different cases. The patients were divided into three main groups.

Group I received sodium bicarbonate by the mouth only. It consisted of 13 cases at the El Centro Hospital. In five of these the urine was alkaline before treatment was commenced, and it continued in this state throughout the duration of the haemoglobinuria ; one of these died, but there is some doubt whether the case was really blackwater and not plasmoquine poisoning. The other 8 cases exhibited strongly acid urine at the onset of blackwater : in two of these the reaction became alkaline during treatment and both recovered ; in the remaining

six the urine continued to be acid, notwithstanding the alkaline treatment, and four of them died.

Nine cases were also treated in this way in other of the Company's hospitals. Although the records are by no means complete, apparently the urine in each patient was acid or neutral at the onset of blackwater. In two the urine became alkaline during treatment and both recovered; of the remaining seven, three died, and in at least two of the fatal cases the urine retained its acid character throughout the duration of haemoglobinuria.

Group II received, in addition, an intravenous injection of sodium bicarbonate at a late stage of the disease when a urinary suppression was threatened. Two cases were treated in this way at the El Centro Hospital, and in both the urine became alkaline almost immediately after the injection was given; one of the patients who had definite suppression of urine at the time of the injection died 18 hours later, the other recovered.

Of the three patients treated in this way at other hospitals, one died.

Group III were given an intravenous injection as soon as the diagnosis was made, and following this sodium bicarbonate was continued by the mouth. In each of the 5 cases treated in this way at the El Centro Hospital, the urine was strongly acid before the injection, but in every case subsequent specimens of urine were alkaline; all the patients recovered.

Of the 4 cases treated at other hospitals by this method two died.

Details of all these cases are given in tables from which it is seen that the mortality among the 36 cases was 12 (33 per cent.). Of the 22 cases in Group I, eight (36 per cent.) died; in five of these the cause of death was suppression of urine, in one suppression and shock following a miscarriage, in one suppression and plasmoquine poisoning (?), and in one subtertian malaria and partial suppression of urine. Of the five cases in Group II, two (40 per cent.) died, both from suppression of urine. Of the 9 cases in Group III, two (22 per cent.) died, both from acute anaemia, cyclical vomiting, and possibly alkalosis.

The following are the author's conclusions :—

" 1. The prognosis in blackwater fever appears to be relatively good in cases which show an alkaline reaction of the urine at the onset of haemoglobinuria. In the eighteen cases of our combined series in which this reaction was either naturally present or was artificially produced by alkalization at an early stage of the disease, the mortality was less than 17 per cent., and in only one of the three fatal cases was urinary suppression present.

" 2. The oral administration of sodium bicarbonate was found to be insufficient to render the urine alkaline in 75 per cent. of the cases which received it in this manner only. On the other hand, the urine was almost immediately alkalinized following the injection of sodium bicarbonate solution intravenously.

" 3. The practice of injecting sodium bicarbonate solutions intravenously after signs of urinary suppression have developed is worth a trial, but is probably of little value. Of the five cases which received it in this manner 40 per cent. died.

" 4. The early administration of intravenous sodium bicarbonate solution in our series of nine cases appears to have had a preventive action on the development of urinary suppression. As this is the principal cause of death in blackwater fever, I believe that such a procedure is justified in all cases which are seen in their early stages. Providing that certain precautions are taken, the danger of producing an unfavourable reaction appears to be slight; the injection should not be given (nor should it be

repeated) in the presence of an alkaline urine, and the solution should be sterilized before, and not after, the addition of the bicarbonate."

W. Y.

ALAIN (M.). A propos de deux cas de fièvre bilieuse hémoglobinurique et de leur traitement par la quinacrine. [**The Treatment of Two Cases of Blackwater Fever by Quinacrine.**]—*Bull. Soc. Path. Exot.* 1934. Jan. 10. Vol. 27. No. 1. pp. 93–97.

BLONDIN (P.) & RIOU (M.). Quinacrine et fièvre bilieuse hémoglobinurique.—*Ibid.* pp. 97–98.

Each of these papers gives details of 2 cases of blackwater fever which were treated with quinacrine ; all the patients recovered.

The dose of the drug was 2 or 3 tablets, each containing 0·1 gm. of quinacrine, daily. It is claimed that there was an immediate improvement in symptoms, that the blood was quickly sterilized, and that there were no untoward effects.

BLANCHARD, in the discussion which followed the reading of these papers, pointed out that, apart from its quite special indication in blackwater fever, it must be remembered that quinacrine has a remarkable action on the schizonts of *P. falciparum*, and on both the schizonts and gametes of *P. vivax* and *P. malariae*. *W. Y.*

FAIRLEY (N. Hamilton) & BROMFIELD (R. J.). **The Determination of Haemoglobinaemia and Methaemoglobinaemia in Blackwater Fever.** [Laboratory Meeting Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Jan. 31. Vol. 27. No. 4. pp. 335–336.

—— & ——. **Laboratory Studies in Malaria and Blackwater Fever. Part II. Blackwater Fever. Haemoglobinaemia.**—*Ibid.* Aug. 4. Vol. 28. No. 2. pp. 141–156. With 2 graphs & 1 coloured plate. [15 refs.]

In these papers the authors concern themselves with the very important subject of haemoglobinaemia in blackwater fever. A method is described for the quantitative determination of oxy- and met-haemoglobinaemia, and the results obtained in a series of blackwater fever cases are given. Some information is also provided regarding a new blood pigment.

The second paper opens with a brief summary of the earlier reports on haemoglobinaemia in blackwater fever. As the summary shows, practically no quantitative observations had been made, apart from those of the reviewer and his colleagues. Methaemoglobinaemia has occasionally been noted, but its presence has evoked surprisingly little comment. ARKWRIGHT and LEPPER (1918) recorded its presence in the serum and plasma of one or two cases, and YORKE, MURGATROYD and OWEN (1930) noted the presence of methaemoglobinaemia in the plasma, but not in the corpuscles of two cases—in the first on the 3rd, 4th and 5th days of the disease and in the second on the 4th day only. ROSS found methaemoglobinaemia in 12 of his 18 cases in which special attention was directed to the spectroscopic appearance of the plasma.

The technique used in the quantitative estimation of haemoglobinaemia is as follows :—

Method of collecting blood.—The first essential is to collect blood by a technique which produces a minimum damage to the red cells and so avoids artificial plasmolysis. It was found that " true plasma " obtained from blood aspirated from the median basilic vein under paraffin, and

subsequently oxalated and centrifuged under paraffin, afforded the best technique for this purpose. "True plasma" showed no trace of haemoglobin bands in 46 of 53 control cases, whilst in the remaining 7 cases the haemoglobin varied from 0·07 to 0·12 per cent. From this it is concluded that plasma haemoglobin must exceed 0·12 per cent. before it can be regarded as significant of haemoglobinaemia.

Spectroscopic method for quantitative estimation.—The technique employed is that of Bloem.* It is briefly as follows :—

The minimum concentration at which the α band just disappears from standard solutions of haemoglobin and methaemoglobin equals 0·33 per cent. and 0·665 per cent. respectively ; using the same standard cell, the degree to which the unknown plasma has to be diluted to obliterate the band is similarly determined ; the concentration of pigment in the unknown is then ascertained by multiplying this standard value by the dilution factor.

Nine cases of blackwater fever were investigated, and in five of them serial quantitative observations were carried out. The case history and other relevant data of each case are given. The quantitative determination of the oxyhaemoglobin and methaemoglobin made in four of the cases is summarized in the following table :—

Cases.	Time after onset in hours.	Percentage.		
		Oxyhaemoglobin.	Methaemoglobin.	Total of haemoglobin.
3	4	1·4	1·3	2·7
	21½†	1·35	2·26	3·6
	46	1·0	2·3	3·3
4	4¾	0·83	1·33	2·16
	16¾†	0·20	1·66	1·86
	23	0·36	1·0	1·36
	40¾	0·13	1·0	1·13
	63¾	0·13	0·66	0·79
5	22	0·26	1·33	1·59
	47½	0·07	1·33	1·4
6	15	2·48	2·66	5·14
	19	2·15	2·66	4·81
	24	1·75	2·66	4·41
	35	1·16	3·33	4·49
	39¾	0·76	3·33	4·09

†Blood transfusion was performed immediately after this specimen was collected.

In all their estimations true plasma was used, and the authors claim that as the risk of artificial plasmolysis was thereby reduced to a minimum, the discoloration of the plasma observed in several of the cases finally disposed of any argument as to whether the haemoglobinaemia may or may not be intense enough to be recognized by the naked eye. One specimen is depicted in a coloured plate. Several different constituents enter into the final discoloration of the plasma. Oxyhaemoglobin produced a rose-red, methaemoglobin a brown, and

*Bloem, 1933. *Biochemical Jl.* *27*, 121.

bilirubin a yellow appearance, and the extent to which one or other of these pigments predominates determines its final appearance. Deep red and brownish red plasma all appear to contain methaemoglobin.

Methaemoglobin was observed in every instance except Case 8, where an entirely new pigment was encountered. In this case a peculiar feature of the illness was the leaden-grey colour of the skin and the mauve tinting of the lips and ears. The plasma until the 11th day contained a brownish pigment resembling methaemoglobin spectroscopically, but unlike it in not being reduced by Stokes' reagent or by ammonium sulphide. This pigment was never found in the urine, although methaemoglobin was demonstrated in numerous urinary specimens. Investigation by KEILIN indicated that it was a new blood pigment—probably some modification of methaemoglobin—details of which will be published later.

The red corpuscles from these cases, after being washed with saline and subsequently lysed in distilled water, exhibited no trace of methaemoglobin ; the rapidity with which these blackish corpuscles regained their normal reddish colour during washing was very striking.

Quantitative estimations in both fatal and non-fatal cases revealed the unexpected fact that methaemoglobin constituted the major portion of the total blood pigment in the haemoglobinaemia. In the fatal cases the oxyhaemoglobinaemia decreased progressively as the methaemoglobinaemia increased. This suggests either an accumulation of methaemoglobin due to the body being unable to destroy or excrete it at the same rate as oxyhaemoglobin, or, alternatively, that as the disease progressed more and more plasma methaemoglobin was produced from oxyhaemoglobin.

In the fatal cases the maximum amount of blood pigment in the plasma (oxyhaemoglobin+methaemoglobin) amounted to 3·6, 4·61, and 5·14 per cent. respectively. Possibly, more numerous observations would have resulted in even higher maximal readings. It appears, therefore, that the haemoglobinaemia in blackwater fever is not nearly as small as was previously thought, and is in fact sufficient to explain the phenomena in blackwater fever in terms of an intravascular haemolysis, without postulating that haemolysis is proceeding in the byways of the spleen and other internal organs shut off from the peripheral circulation. In blackwater fever the methaemoglobin appears to arise from oxyhaemoglobin, which has been liberated from the corpuscles after lysis. In this respect, the methaemoglobinaemia encountered in blackwater fever differs fundamentally from that induced by certain drugs where the methaemoglobin so often has an intra-corpuscular location, and in the absence of haemolysis may fail to appear in the plasma or to be excreted in the urine. *W. Y.*

MINATOYA (Takeo). Durch Hämoglobininjektion verursachte Hämoglobinurie. [**Haemoglobinuria due to Haemoglobin Injection.**]—*Tohoku Jl. Experim. Med.* 1934. Sept. 28. Vol. 24. Nos. 1 & 2. pp. 11–20. [11 refs.]

The experiments described in this paper were undertaken mainly with the object of ascertaining whether the haemoglobin which appears in the urine of an animal which has received an intravenous injection of heterologous or isologous haemoglobin, is derived entirely from the injected haemoglobin or in part from the animal's own erythrocytes.

Immune sera were prepared firstly by injecting rabbits with horse haemoglobin, and secondly by injecting guineapigs with rabbit haemoglobin. A number of rabbits were then given an injection of horse haemoglobin and the resulting haemoglobinuria examined by the precipitin test with the above sera. The result indicated that the haemoglobin in the urine was derived entirely from the horse haemoglobin.

Examinations were then made of the number and volume of the erythrocytes in rabbits at various intervals after intravenous injection of horse or rabbit haemoglobin. It was found that there was a fall both in the number and volume of the red cells, and that this was greater after the injection of horse haemoglobin than after rabbit haemoglobin. In later experiments so much haemoglobin was given that the animals were reduced to a critical condition ; although a fall in the erythrocyte number and volume was observed no evidence of the host's haemoglobin could be found in the urine. [There seems to be a possible fallacy in the author's assumption that the cause of the fall in the erythrocyte number and volume seen in the experimental rabbits was due to a destruction of erythrocytes consequent upon the haemoglobin injection. It is, of course, impossible to form any definite opinion on the matter unless we know that the blood volume did not alter. If there was any increase in blood volume after the injection there would naturally be a fall in the apparent erythrocyte number and volume, even though the erythrocytes themselves were completely uninfluenced by the haemoglobin injection.] *W. Y.*

VOIGT (E. M.) & VOIGT (C.). Ueber antihämolytisches Serum (Versuche zur Schwarzwasserfieberfrage). (Vorläufige Mitteilung.) [**Antihaemolytic Serum. Experiments on the Blackwater Fever Problem.**]—*Arch. f. Schiffs- u. Trop.- Hyg.* 1934. June. Vol. 38. No. 6. pp. 232–243. [21 refs.] English summary.

The work here described was undertaken with the object of studying the haemolytic process in blackwater fever, and with the hope of discovering some substance which will counteract the haemolysin.

As the authors rightly observe, in order to prevent the action of a haemolysin it is necessary to discover something about that haemolysin and to prepare a specific antihaemolysin. It is possible that the destruction or damage of the red cells in blackwater is dependent upon the failure of certain substances in the serum or in the blood cells which are necessary for their integrity and for their protection against the influence of external bodies. With this idea in mind the authors have commenced an investigation of several aspects of the blood chemistry in blackwater fever ; lipoid metabolism in particular seemed to be a promising field for investigation.

There is a general notion that a lowering of the cholesterin content of the serum or red corpuscles is related to a tendency to the disintegration of the latter. The authors employed Bloor's method which consists in making an alcohol-ether extract of blood—cells and serum—as for the estimation of the total fats. Up to the present they have failed to observe any specially low values ; in whole blood and in red cells the values obtained were somewhat higher than for the serum. After recalling that in acute nephritis hypercholesteraemia is the rule, whilst in chronic interstitial nephritis, with retention of nitrogen but without oedema, an increase of the cholesterin value is

found, the authors state that it seems to them to be important to determine whether in recurrent blackwater cases the red cells habitually contain more cholesterin than normally.

MATKO put forward the theory that phosphate metabolism played a part in the haemolysis of blackwater fever [this *Bulletin*, Vol. 12, p. 358] and the question has been recently examined by WHITMORE, who also observed the interesting fact that in two cases of blackwater the lecithin content of the blood was considerably below normal [*loc cit.*, Vol. 26, p. 1026].

The authors themselves have not yet had the opportunity of determining the lecithin content of the washed red corpuscles from cases of blackwater fever, but the point must be investigated. According to MEYER and OVERTON (1901) the stroma of the red cell consists one-third of lipoids and two-thirds of protein ; any factor which decreases the phosphorus content of the red cell interferes with the functioning of the cell membrane and may lead to disintegration of the cell. The organic phosphate content of the serum has been determined in various cases, but so far it has never been found to be definitely lowered.

Impressed by recent work upon disappearance of serum complement in acute conditions, the authors have attempted to produce evidence of unexpended haemolysin in the sera of blackwater fever cases by the addition of fresh guineapig serum. While freely admitting that there is no definite evidence that any serum haemolysin is at work in any stage of blackwater fever, it nevertheless seemed reasonable to the authors to seek a substance capable of neutralizing antihuman haemolytic ambocepter, and to try it as a remedy and to examine its effect, if any, upon the known death rate and relapse incidence. They claim to have produced, by injecting haemolytic sera into baboons, pigs, and a few human volunteers, sera which inhibit the action of anti-human haemolytic amboceptor. The antibody produced in the human beings is upon trial in blackwater fever cases in Rhodesia and South Africa.

W. Y.

GIGLIOLI (George). **Further Studies on the Epidemiology and Etiology of Blackwater Fever in the Interior of British Guiana. Immunity in Blackwater Fever.**—*Riv. di Malariologia.* 1932. Nov.–Dec. Vol. 11. No. 6. pp. 785–807. With 4 figs. [15 refs.]

This paper, which reports on certain epidemiological characteristics of blackwater fever on the Demerara, tending to throw light on the very difficult problem of immunity in blackwater fever, was published elsewhere and was noticed in this *Bulletin*, Vol. 30, p. 517. *W. Y.*

THÉMELIN. Un cas de transfusion avec résultat favorable chez un malade atteint de fièvre bilieuse hémoglobinurique grave. [**A Case of Blackwater Fever Successfully treated by Transfusion.**—*Bull. Méd. du Katanga.* 1933. Vol. 10. No. 4. pp. 95, 97–98.

Details are given of a severe case of blackwater fever, which recovered after blood transfusion. *W. Y.*

PERATONER (U.). L'emoglobinuria nella malaria. (Contributo clinico e terapeutico.)—*Riv. di Malariologia.* 1934. Vol. 13. No. 1. pp. 58–65. [16 refs.] French summary (5 lines).

MISCELLANEOUS.

STRAUSS (Maurice B.). **The Rôle of the Gastro-Intestinal Tract in conditioning Deficiency Disease. The Significance of Digestion and Absorption in Pernicious Anaemia, Pellagra and "Alcoholic" and Other Forms of Polyneuritis.**—*Jl. Amer. Med. Assoc.* 1934. July 7. Vol. 103. No. 1. pp. 1–4. [48 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Deficiency disease in man may and frequently does develop owing to some disturbance in the gastro-intestinal tract in spite of an adequate diet. Pernicious anaemia is a deficiency disease due to the absence from the gastric juice of a specific heat-labile factor which reacts with an extrinsic factor contained in the food. It may result in the presence of an adequate diet and normal gastric juice where there is inadequate absorption from the intestine. It has been observed in chronic bacillary dysentery and in coeliac disease and in strictures and multiple anastomoses in the intestine. Surgical relief of the stricture has resulted in cure of the anaemia. The author observed a case of pernicious anaemia in a boy of 8 years due to short-circuiting between intestinal loops. At least 4 of this type of case have been relieved of their anaemia by liver therapy alone without operative treatment. Pellagra, in the endemic form, is probably due to lack of vitamin B_2 in the diet, but in the North (U.S.A.) it is seen, with rare exceptions, in persons with lesions or abnormalities of the gastro-intestinal tract or in chronic alcoholic addicts. In alcoholics a moderately faulty diet may also play a part. All types of gastro-intestinal lesions have resulted in pellagra; amongst the commonest are cancer of the stomach (usually with pyloric obstruction), rectal stricture, ulcerative colitis, gastro-enterostomy and the author has seen it in mucous colitis, duodenal ulcer, diaphragmatic hernia and stenosis of the small intestine. In most of the author's cases the lesion has prevented the taking of an adequate diet, but in at least ten cases the diet was entirely adequate. Polyneuritis is rarely seen in the North except when it is conditioned by gastro-intestinal factors, the most common of which is chronic alcoholism. It was previously shown that over 80 per cent. of cases of alcoholic polyneuritis had gastric anacidity or hypoacidity and that 95 per cent. had partaken of grossly inadequate diets. Recently 6 patients of this type were given 1–2 pints of whisky (or the amount usually taken) daily, and relief of the neuritis was obtained by oral or hypodermic administration of large quantities of vitamin B. The "toxic" polyneuritis of pregnancy occurs only after "pernicious vomiting"; the author has recorded 3 cases cured by giving adequate amounts of vitamin B. Polyneuritis has been reported as following persistent vomiting due to several causes and associated with various gastro-intestinal lesions. Beriberi has also been observed to follow gastro-intestinal trouble (*e.g.*, coeliac disease, chronic dysentery, etc.). Hypochromic anaemia is another example of faulty absorption (due to achlorhydria), and the "toxic" state of intestinal obstruction is probably a manifestation of a deficiency of water and electrolytes rather than of a toxaemia. *H. N. H. Green.*

DOBREFF (Minko). Ueber die Selbstvergiftungen mit Chinin in Bulgarien. [**Self-Poisoning with Quinine in Bulgaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. July. Vol. 38. No. 7. pp. 288–291.

In the last four years in one-third of the cases of poison self-administered in Bulgaria quinine was the agent used, and at the University Clinic at Sofia in the last 7 years 82 quinine cases have been admitted against 51 self-poisonings with other substances. The chief cause seems to be the popularity of this drug for "stimulating menstruation," and this is supported by the observation that of 86 patients 69 were women, and nearly all under 30. The average quantity of "quinine" taken was 4–6 gm.; the largest dose 16 gm. All recovered. Some had albuminuria with red cells in the urine, others amblyopia or temporary loss of vision. [Nothing is said of deafness or other symptom, nor do we learn what proportion of the women were pregnant. In his conclusions the author writes of "Chininselbstmordversuche," but it seems doubtful whether all these attempts were suicidal.]

A. G. B.

GHOSE (A. K.). **Naga Sore in a Tea-Estate Practice.**—*Indian Med. Gaz.* 1934. June. Vol. 69. No. 6. pp. 316–318.

The author's account of Naga sore or tropical phagedaenic ulcer agrees with other accounts in that it occurs in coolies doing outdoor work, is usually preceded by a prick or injury of some kind, and is mainly found on the legs below the knees. Like others he suggests soil infection. It appears at the beginning of the rains, attaining its maximum in June and July, the busiest season of the year, and disappearing in December. The average period of disability was 38 days. He states that 20 per cent. of newly recruited coolies were affected and only about 2 per cent. of old coolies [but the numbers are small]. He cauterizes thoroughly with pure carbolic acid and after separation of sloughs dresses antiseptically. He advocates for prevention compulsory leg washing in an antiseptic solution.

[A useful editorial appears in the same number. The possible association with soil is mentioned, but not the suggestion of J. A. YOUNG that "the reservoir of infection may lie in the termite's nest" (this *Bulletin*, Vol. 29, p. 525). Perhaps in India this affection occurs where termites are absent.]

A. G. B.

NADLER (J. Ernest), GREEN (Henry) & ROSENBAUM (Arthur). **Intravenous Injection of Methylene Blue in Man with Reference to its Toxic Symptoms and Effect on the Electrocardiogram.**—*Amer. Jl. Med. Sci.* 1934. July. Vol. 188. No. 1. pp. 15–21. With 1 fig. [22 refs.]

Methylene blue has been used in various conditions, including malaria and leprosy. The authors gave 18 normal adults 50 cc. of a 1 per cent. solution; elimination of the dye took 3 to 5 days; two persons received three injections. The drug was found to have two actions: it oxidized some of the haemoglobin to methaemoglobin and produced restlessness, paresthesia, "burning" in mouth and stomach, pain in chest and strangury, the manifestations lasting 24 to 48 hours. It had also an effect on the electrocardiogram. The authors "wish to point out that the indiscriminate use of methylene blue may produce unpleasant results and be dangerous to the patient."

A. G. B.

PIGULEWSKY (S. W.). Einige klinische Beobachtungen ueber die Wirkung des Skorpiongiftes auf den Menschen. [**Clinical Notes on the Action of Scorpion Poison on Man.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Aug. Vol. 38. No. 8. pp. 350–355. With 2 figs. [33 refs.]

The author's observations were made in the Karakal steppe region in Russian Turkestan and he describes the symptoms with much detail in three cases. Twelve species of scorpions have been described from the U.S.S.R. In the Karakal steppes they appear in May and early in September near houses and stables; they sting in May, rarely in the autumn. The symptoms last as a rule from 2 to 5 days. A fatal result is rare. *A. G. B.*

DO AMARAL (Afranio), APANTES (J. Bernadino) & DA FONSECA (Flavio). Sobre a duração da actividade das antitoxinas e antivenenos. [**Duration of Activity of Antitoxins and Antivenins.**]—*Brasil-Medico.* 1934. July 7. Vol. 48. No. 27. pp. 525–532. [22 refs.] English summary.

The English summary runs thus :—

" In the retitration of many samples of antitoxins and antivenines that had aged for a period sometimes as long as 25 years under ordinary conditions, without special preservation precautions, in the consumers' hands, many interesting facts have been disclosed. These may be briefly summarized as follows :—

" 1. The precipitate formed with the ageing of antitoxins and antivenines and represented by pseudoglobulin seems not to exert any marked influence upon their activity.

" 2. Neither the method of refination or concentration by fractionated precipitation of globulins as employed at the Instituto Butantan in its routine work since 1917, nor their final hydrogen ion concentration (pH) seems to contribute towards their inactivation even after a long ageing as proved by the retesting of samples of batches concentrated as nearly [? early] as 1916 at the Instituto Butantan.

" 3. Ageing itself probably is not the cause of their (distribution) becoming more or less stabilized afterwards. Their inactivation at first may reach 50 per cent. of their primitive titer of which the loss seldom represents 66 per cent. (exceptionally 70 per cent.) even after 25 years of ageing.

" 4. Therefore, there is no definite reason for aged antitoxins and antivenins to be entirely discarded from consumption inasmuch as virtually all producing laboratories leave a margin of safety in the titer borne on the label of the ampoules of each batch they prepare."

HOVERSON (Emil T.) & PETERSEN (William F.). **Meteorologic Effects on the Sedimentation Rate of Erythrocytes.**—*Amer. Jl. Med. Sci.* 1934. Oct. Vol. 188. No. 4. pp. 455–461. With 1 chart.

An interesting article and a timely warning to those who are inclined to rush to conclusions based on their findings of the rate of sedimentation of red corpuscles in disease and in health. Stress has been laid on the sedimentation rate in malaria, in leprosy, in tuberculosis and other conditions (see NEWHAM, this *Bulletin*, Vol. 25, p. 496).

It is fairly widely agreed that in acute infections the rate is hastened, and that as improvement occurs the rate falls. Others have found that there are daily variations in normal subjects; and it is certainly true that the rate differs in a tuberculous subject according to the presence or absence of fever.

The authors found that the method used, Linzenmeier's, or Westergreen's and Cutler's, did not affect the results. One of the authors has been investigating during the past six years the detailed physiological and pathological changes associated with meteorological alterations, and finds that " pressor episodes, falling carbon-dioxid and increasing blood pH, localized or general anoxemia, alternate with periods when the diastolic blood pressure falls, the carbon-dioxid content increases, the blood pH decreases, basal metabolism and oxidation increases." Daily determinations were made whenever possible on 12 subjects between 28th January and 1st March, 1934, and the results were graphed. This time of year was chosen because it is commonly a time when meteorological changes and disturbances are common in Illinois, and as a matter of fact there were 9 distinct disturbances in the period of observation.

The authors found that there are wide daily variations in rate of sedimentation of erythrocytes, amounting to as much as 100 per cent., and that there is a correlation between these daily variations and the meteorologic changes. *H. H S.*

LEAO (A. E. de Arêa). Sur une mycose osseuse par *Acremoniella*. Nouvelle espèce de champignon trouvée chez l'homme : *Acremoniella rugulosa* n. sp. [**Mycosis of Bone due to** *Acremoniella rugulosa* **n. sp.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1158–1160.

Infection of man by this genus has been observed only in Italy and now in Brazil.

A Brazilian resident of Rio de Janeiro, which he had never left, wounded his leg a year before with a splinter of wood ; to which succeeded pain, swelling, abscess and fistulae. When seen there was oedema of the leg and at the upper third of the fibula three fistulas giving vent to yellowish pus. Above were gummas. A radiogram showed that the upper third of the fibula was affected and the head destroyed. No general reaction. Search for tubercle by Mantoux's reaction and inoculation of guineapig was negative. A gumma was punctured, fluid was sown on glucose agar, and after 12 days the fungus developed. Its characters under the microscope and in culture are described. The case was treated surgically with success.

A. G. B.

MOORE (M.). *Posadasia pyriformis* **and** *P. capsulata,* **Two Causative Organisms of Darling's Histoplasmosis in the United States.**—*Ann. Missouri Bot. Gard.* 1934. Vol. 21. No. 2. pp. 347–348. [Summarized in *Rev. Applied Mycology.* 1934. Oct. Vol. 13. Pt. 10. p. 637.]

" Diagnoses are given in English and Latin of two fungal organisms, *Posadasia pyriformis* n. sp., and *P. capsulata* (Darling) Moore, n. comb. (syn. *Histoplasma capsulatum* Darling) associated with the human disease known as Darling's histoplasmosis, characterized by an acute specific infection usually affecting the epithelial and endothelial cells of the lungs, liver, and spleen. The organisms may also be present in a free state in these organs, as well as in the blood stream, reproduction in the host being by single yeast-like cells. In culture a

mycelium, conidia, chlamydospores, and multispored asci are formed. Complete morphological, cultural, biochemical, and cytological details will be given in a subsequent paper."

i. DE MONBREUN (W. A.). **The Cultivation and Cultural Characteristics of Darling's** *Histoplasma capsulatum.—Amer. Jl. Trop. Med.* 1934. Mar. Vol. 14. No. 2. pp. 93–125. With 1 fig. & 5 plates. [26 refs.]

ii. DODD (Katharine) & TOMPKINS (Edna H.). **A Case of Histoplasmosis of Darling in an Infant.**—*Ibid.* pp. 127–137. With 13 figs. on 2 plates.

i. The paper describes the cultivation of *Histoplasma capsulatum*. The fungus may be grown either as a yeast or as a mycelium, the former being the actual pathogenic phase. Certain cultural characters suggest that the organism belongs to the Endomycetales group of fungi. The author proposes altering the well-known name of the disease caused by the fungus from Histoplasmosis of Darling to Cytomycosis of Darling, a procedure which hardly seems necessary.

ii. The authors describe a case of histoplasmosis in an infant six months old, a native of Tennessee. The diagnosis was made during life by the discovery of the characteristic yeast-like parasite in large mononuclear cells in the peripheral blood. It seems that these large mononuclear cells blocking the blood vessels and actively phagocyting red blood corpuscles are responsible for most of the symptoms of the disease. *C. M. Wenyon.*

REDAELLI (P.) & CIFERRI (R.). Études sur l' " Histoplasma capsulatum " Darling : I. Reproduction expérimentale de l'histoplasmose, et définition de la maladie comme réticulo-histocytose parasitaire atteignant divers systèmes de l'organisme. [**Experimental Studies on** *H. capsulatum.*]—*Bol. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1934. June. Vol. 6. No. 6. pp. 193–195.

The author refers to the work of DE MONBREUN, who has cultivated *Histoplasma capsulatum* in two forms, as a yeast and as a mould. With the yeast form he states that he has been able to reproduce the human disease in monkeys only. The mould form he claims is not pathogenic to any animal. The present writer states that by inoculating the mould subcutaneously in guineapigs a local lesion is produced from which he obtained material which gave rise to the typical Histoplasma infection of the reticulo-endothelial system when inoculated into guineapigs and rabbits. *C. M. W.*

CIFERRI (R.) & REDAELLI (P.). *Histoplasma capsulatum* **Darling, the Agent of " Histoplasmosis " : Systematic Position and Characteristics.**—*Jl. Trop. Med. & Hyg.* 1934. Sept. 15. Vol. 37. No. 18. pp. 278–280. [13 refs.]

Having studied cultures of *Histoplasma capsulatum* the authors arrive at the conclusion that it belongs to the Blastosporales " sensu lato," of which it forms the type of a new family for which they propose the name Histoplasmaceae. *C. M. W.*

SVENSSON (Ruth) with the co-operation of F. J. LINDERS. **The Chances of detecting Infections with Intestinal Protozoa. A Parasitological and Statistical Survey.**—*Acta Med. Scandinavica.* 1934. Vol. 81. No. 3/4. pp. 267–324. With 4 diagrams. [13 refs.]

As a result of an exhaustive examination of 74 persons in a mental hospital in Sweden, the author has found all the usual intestinal protozoa. By somewhat elaborate statistical calculations it is concluded that neither 3 examinations, nor even 6, of any two groups of individuals give sufficient indication of the actual infections present for the two groups to be compared. If, however, 10 examinations are carried out on the individuals of each group the results will be sufficiently accurate for purposes of comparison. *C. M. W.*

ANDREWS (Justin). **The Diagnosis of Intestinal Protozoa from Purged and Normally-Passed Stools.**—*Jl. Parasitology.* 1934. June. Vol. 20. No. 4. pp. 253–254.

Data are given showing that the single examination of a stool obtained after the use of a saline cathartic will reveal at least 75 per cent. of the protozoan infections which will be found by six or more examinations of normal stools. *C. M. W.*

HEGNER (Robert). **Intestinal Protozoa of Chimpanzees.**—*Amer. Jl. Hyg.* 1934. Mar. Vol. 19. No. 2. pp. 480–501. [35 refs.]

Examination of a number of chimpanzees has revealed intestinal protozoa which correspond so closely with those that occur in man that they cannot be distinguished from them morphologically. These are *Entamoeba* (of the *E. coli*, *E. gingivalis* and *E. histolytica* types), *Endolimax*, *Iodamoeba*, *Giardia*, *Chilomastix*, *Trichomonas* (intestinal and vaginal), *Retortamonas* (*Embadomonas*) and *Balantidium*. In addition were found the ciliate of the genus *Troglodytella* and a flagellate of the genus *Hexamita* which are not represented in man. The various combinations of infections in the animals examined are described and the previous records of infections in chimpanzees are discussed. *C. M. W.*

SASSUCHIN (D. N.). **Hyperparasitism in Protozoa.**—*Quarterly Rev. Biol.* 1934. June. Vol. 9. No. 2. pp. 215–224. With 11 figs. [18 refs.]

In this illustrated article the author reviews our knowledge of parasites which are liable to invade the cytoplasm or nucleus of parasitic protozoa. The importance of these organisms is that on more than one occasion they have been thought to represent stages in the development of the host. It is only by the recognition of their structure and development that such errors are to be avoided. The best known forms are *Sphaerita* and *Nucleophaga*, but others occur such as various microsporidia, while nematodes have even been described as living in ciliates. *C. M. W.*

RICHARDSON (Flavia L.). **Studies on Experimental Epidemiology of Intestinal Protozoan Infections in Birds.**—*Amer. Jl. Hyg.* 1934. Sept. Vol. 20. No. 2. pp. 373–403. With 1 fig. [25 refs.]

In this long paper the author gives an account of experiments which have occupied him for about 2½ years. They were undertaken to study the susceptibility of young parasite-free chicks to the intestinal protozoa of fowls and other domestic birds and also of a number of wild birds. As was to be expected chicks are readily infected with Entamoeba, Trichomonas and Chilomastix of the fowl. As tested by infectivity to chicks, these protozoa survived in faeces outside the body for 10, 4 and 40 days respectively. The first named survived up to 28 days in diluted faeces, while in this medium the cystless Trichomonas survived under an hour. Experimentally infected chicks readily passed on their infection to clean chicks placed in contact with them. Similarly chicks infected from ducks, turkeys and pheasants handed on their infections to healthy chicks associating with them. As regards cysts it was found that the minimum numbers required to produce infections in chicks were 240 for *E. gallinarum* and 1 for *C. gallinarum*. *Trichomonas gallinarum* not possessing cysts required 200,000 trophozoites to infect. The protozoa in wild birds vary in their infectivity to chicks, sometimes heavy infections in the wild bird failing to produce infection in the chick.

The ease with which chicks hand on their infections to one another is of interest from the point of view of the spread of *E. histolytica* infection in families and institutions, and again suggests the importance of food handlers in helping to bring this about [but see this *Bulletin*, Vol. 31, p. 734]. *C. M. W.*

GUPTA (B. M. Das). **Observations on a Case of Coccidial Infection in Man** (*Isospora belli* **Wenyon, 1923).**—*Indian Med. Gaz.* 1934. Mar. Vol. 69. No. 3. pp. 133–134. With 2 figs. on 1 plate.

The case is that of a Bengali who had never been out of India. He suffered from acute diarrhoea which gradually subsided during the course of three weeks. A stool examination on the second day revealed oöcysts of the coccidium which were present in fair numbers during the next three days. After this they gradually decreased in number so as to be detectable only by a concentration method. They were last seen on the 20th day. No other cause for the trouble could be discovered.

C. M. W.

RATCLIFFE (H. L.). **Gastric Mucin as a Culture Medium for Intestinal Protozoa.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Feb. Vol. 31. No. 5. p. 602.

Mucin, a natural constituent of the intestinal contents, is prepared commercially as a white powder readily soluble in distilled water, giving solutions which may be sterilized in the autoclave. A 3 per cent. solution of mucin in 0·5 to 0·7 per cent. aqueous NaCl with the addition of sterile rice starch may be used to cover slants (liver infusion agar) or as a liquid medium for the cultivation of intestinal protozoa of various kinds. *C. M. W.*

KOFOID (Charles A.), MCNEIL (Ethel) & BONESTELL (Aileen). **Correlation of the Distribution of the Protozoa in the Intestine of *Rattus norvegicus* with the Hydrogen Ion Concentration of the Intestinal Contents and Wall.**—*Univ. California Public. Zool.* 1933. Vol. 39. No. 8. pp. 179–190. With 3 figs. [11 refs.]

The authors have studied the distribution of various flagellates and amoebae in the intestine of rats and have made pH readings of the intestinal contents with a view to determining the range of pH within which these protozoa live. *C. M. W.*

KNOWLES (R.) & GUPTA (B. M. Das.). **Some Observations on *Balantidium coli* and *Entamoeba histolytica* of Macaques.**—*Indian Med. Gaz.* 1934. July. Vol. 69. No. 7. pp. 390–392. With 10 figs. on 1 plate.

A species of Balantidium, corresponding morphologically with *Bal. coli* of man, is very common in *Silenus rhesus* sold in the Calcutta market. This ciliate has been cultivated in the medium (inspissated horse serum and egg white to which is added a little solid rice starch) recommended for the culture of *Entamoeba histolytica* by DOBELL and LAIDLAW (1926), who also suggested the addition of a few drops of acriflavine solution to keep down the growth of Blastocystis. In most cases excellent results were obtained, the Balantidium showing division, encystation, excystation and conjugation. Attempts to infect man with the ciliate failed, though *E. histolytica* of the monkey, which was present in one culture, established itself in the volunteer.

C. M. W.

FISCHER (F. P.) & FISCHL (Viktor). Elektrophorese von Trypanosomen und Spirochäten. [**Electrophoresis of Trypanosomes and Spirochaetes.**]—*Biochem. Ztschr.* 1933. Dec. 27. Vol. 267. No. 4–6. pp. 403–404.

The authors show that trypanosomes and relapsing fever spirochaetes, both in their natural media and in physiological saline solution, whether alive or dead, always make their way to the kathode when brought into an electric field. This property is quite independent of virulence or susceptibility to specific remedies and is the reverse of the behaviour of red blood corpuscles which, as is known, pass to the anode.

C. M. W.

BOXHALL (G. N.), HAPPOLD (F. C.) & LLOYD (Ll). **Quinanil as a Bactericidal Agent in the Isolation of an Insect Flagellate.**—*Parasitology.* 1934. Apr. Vol. 26. No. 1. pp. 44–48. [16 refs.]

The authors have succeeded in obtaining bacteria-free cultures of a flagellate closely allied to *Herpetomonas muscarum* from the intestine of *Polietes lardaria* by exposing the flagellates to quinanil in dilutions of 1/10,000 or 1/100,000 for 2–4 hours. Tubes of Locke serum agar containing the same reagent in dilutions of 1/10,000 or 1/50,000 were then inoculated and from these, tubes of Locke serum agar without the reagent. In certain cases cultures of the flagellate were obtained which were proved by exhaustive tests to be free from contaminating organisms. It seems probable that quinanil may be of use for ridding cultures of other protozoa from associated bacteria. *C. M. W.*

LWOFF (André). Die Bedeutung des Blutfarbstoffes für die parasitischen Flagellaten. [**Significance of Blood Colouring Matter for Parasitic Flagellates.**]—*Zent. f. Bakt.* I. Abt. Orig. 1934. Jan. 31. Vol. 130. No. 7/8. pp. 498–518. With 8 figs. [Refs. in footnotes.]

In this highly technical article, which is largely physiological chemistry, the author discusses observations he has made with a view to the determination of the part played by haemoglobin in blood media used for the culture of certain Trypanosomidae. *C. M. W.*

COLAS-BELCOUR (J.). Influence de quelques bactéries et champignons sur la culture de trypanosomides. [**Influence of Bacteria and Fungi on the Cultivation of Trypanosomidae.**]—*Ann. Inst. Pasteur.* 1934. May. Vol. 52. No. 5. pp. 533–539.

From the work of LWOFF it is known that *Strigomonas fasciculata* will not grow in peptone water unless some blood, albeit a very minute quantity, is added. The author has found that certain bacteria and yeasts can replace the blood and that they in some way assist the flagellate in its development. Growth of *Leptomonas ctenocephali* could not be obtained under these conditions. *C. M. W.*

ROBERTSON (Muriel). **An *in vitro* Study of the Action of Immune Bodies called forth in the Blood of Rabbits by the Injection of the Flagellate Protozoon** *Bodo caudatus*.—*Jl. Path. & Bact.* 1934. May. Vol. 38. No. 3. pp. 363–390. [46 refs.]

With a view to throwing light on some of the problems of protozoal immunity, the author has investigated the production of immune bodies in rabbits by injecting them with bodo, either living or killed by heat or formalin. The paper describes the production of an immune serum, the technique used and the method of cultivating the flagellates.

The heated immune sera tested on living bodos in mammalian Ringer's solution caused varying degrees of immobilization, agglutination and gradual death without lysis. The killing titre of the sera varied from 1/800 to 1/3,200 and it was found that it was better to measure the immune body content by the death of the flagellates rather than by the agglutination, which was more variable. The addition of guineapig complement to the heated sera brought about lysis, which occurred usually before any agglutination became evident. The addition of the complement brought about a reduction in the killing time of the serum dilutions used. Carrying out the tests in distilled water in the place of Ringer's solution it was found that agglutination did not take place though loss of motility and death by lysis occurred. The results obtained in this investigation are discussed and compared with the findings of other investigators who have employed various parasitic protozoa as antigens for the purpose of producing immune sera. *C. M. W.*

HEGNER (Robert). **Passage of *Trichomonas hominis* in a Viable Condition through the Stomach and Small Intestine of a Monkey.**—*Jl. Parasitology.* 1934. Mar. Vol. 20. No. 3. p. 199.

Though it has been shown that trichomonas, which, as is well known, form no cysts, are able to withstand the gastric juice and pass through the stomach alive in the case of rats, guineapigs and cats, no one has hitherto shown this to be the case in larger animals. In this note the

author describes how he introduced the trichomonas of man into the stomach of a monkey and later found them alive at various points in the small intestine. The experiment indicates the probability that in man the flagellates may reach the large intestine after ingestion and thus establish an infection. *C. M. W.*

HEGNER (Robert). **Infections of the Vagina of Rhesus Monkeys with** *Trichomonas hominis* **from Man.**—*Jl. Parasitology.* 1934. June. Vol. 20. No. 4. pp. 247–248.

Cultures of *Trichomonas hominis* were inoculated into the vagina of *Macacus rhesus.* From a number of experiments it was found that the flagellate was able to survive without multiplication for 20 days. The author and RATCLIFFE have already (1927) described naturally occurring trichomonas (*Trichomonas macacovaginae*) from the vagina of monkeys, while in the following year the author recorded experiments which favoured the conclusion that the intestinal and vaginal trichomonas of the monkey were identical. From the experiments recorded in the present paper it would seem that the human trichomonas is unable to establish itself in the vagina of the monkey. It was found that a half per cent. solution of formalin was completely successful in disinfecting the vagina of naturally infected monkeys.

C. M. W.

LOPEZ NEYRA (C. Rodriguez) & SUAREZ PEREGRIN (Eduardo). Sindromes parasitarios en la región Granadina y estudio sobre el parasitismo intestinal humano. I. Estudio critico de los " Chilomastix " parasitos humanos y descripción de una especie nueva hallada en el intestino del hombre en Granada. [**Chilomastix, Parasitic in Man in Granada. A New Species.**]—30 pp. With 3 plates (2 coloured). 1933. Madrid: Comisión Permanente de Investigaciones Sanitarias, Dirección General de Sanidad.

From a study of *Chilomastix* infections of man in Granada the authors arrive at the conclusion that two species occur—the well-known *C. mesnili* and a new one which is given the name *C. granatensis,* which is to be distinguished from the first by its larger size and other details. They also refer to a flagellate described by CHATTERJEE (1923) as *Tetrachilomastix bengalensis.* This was examined by the reviewer, who pointed out that it was a *Chilomastix* (Protozoology, p. 692). The authors of the paper under review, misinterpreting the reviewer's remarks, now, without justification, propose a new name *Chatterjeeia.* Both these names are thus synonyms of *Chilomastix.* Whether the conclusions of the authors that they were studying a new species of *Chilomastix,* their *C. granatensis,* are justifiable or not future investigation alone will show. It should be remembered, however, that *C. mesnili* is subject to great variations in size and that the methods of fixation employed by the authors are open to criticism. *C. M. W.*

WATT (John Y. C.). **On** *Embadomonas sinensis* **Faust and Wassell, 1921.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1331–1335. With 1 fig.

In 1922 FAUST described as *Embadomonas sinensis* an intestinal flagellate which he had seen in human beings in China. It was stated

to differ from *E. intestinalis* not only in being larger but in that the two flagella were of equal thickness, which was not the case with those of *E. intestinalis*. Some doubt was thrown on the correctness of these conclusions. The author of the present paper records from Peiping two cases of infection with a flagellate corresponding with the form described by FAUST. He is convinced that *E. sinensis* is a good species. It is stated that a dog which showed cysts of *Entamoeba histolytica* in its stools was infected with the flagellate by feeding it with material containing cysts. The appearance of the flagellate three days later coincided with an attack of dysentery associated with the presence of active amoebae. *C. M. W.*

BISHOP (Ann). **Observations upon** *Embadomonas intestinalis* **in Culture.**—*Parasitology*. 1934. Apr. Vol. 26. No. 1. pp. 17–25. With 19 figs. on 1 plate. [22 refs.]

The author has cultivated *Embadomonas intestinalis*, the human intestinal flagellate, in a medium consisting of inspissated horse-serum slopes covered either with Ringer egg-white or inactivated horse-serum diluted 1 in 10 in 0·5 NaCl solution. Growth takes place at 17–20°C. as also at 37°C. Attempts to infect tadpoles of the toad (*Bufo vulgaris*) failed. The division stages of the flagellate as seen in culture are described and figured, as also the cysts, in which the nuclear membrane and peripheral chromatin is elongated and stains intensely. The author does not accept WENRICH'S contention that the generic name of the flagellate should be *Retortamonas* Grassi, 1879. *C. M. W.*

ATCHLEY (F. O.) & SWEZEY (W. W.). **A Method for the Enumeration of Ciliate Protozoa.**—Reprinted from *Trans. Amer. Microscopical Soc.* 1934. Jan. Vol. 53. No. 1. pp. 35–39. With 1 fig.

During investigations on ciliates (Troglodytella and Balantidium) of the intestine of the chimpanzee a method was devised for estimating the total number of organisms in a specimen of faeces within which the distribution is not uniform. STOLL'S method for helminthic egg counting was modified for this purpose and was found to give satisfactory results. The procedure is to add 4 cc. of the faecal material to 50 cc. of Ringer's solution to which 6 cc. of a formol iodine fixative has been added. The mixture is shaken up with glass beads, allowed to stand for 24 hours and then reshaken. The ciliates in 0·075 cc. of the mixture are then counted under a 22 × 30 mm. cover slip.

C. M. W.

NELSON (E. Clifford). **Observations and Experiments on Conjugation of the** *Balantidium* **from the Chimpanzee.**—*Amer. Jl. Hyg.* 1934. July. Vol. 20. No. 1. pp. 106–134. With 4 text figs. & 12 figs. on 1 plate. [21 refs.]

A careful study of Balantidium from the colony of chimpanzees which had been maintained for over two years at the Johns Hopkins University and its comparison with the ciliates from the pig, guineapig and rhesus monkey has shown that it resembles most closely *Bal. coli*, but whether it is actually identical with the form in the pig can only be decided when it has been finally settled whether the *Bal. suis* type which occurs in the pig but not in the chimpanzee is a distinct ciliate

or merely a stage of the *Bal. coli* type. It is concluded that *Bal. caviae* Neiva *et al*, 1914 of the guineapig is a good species. The paper describes the range in size and form of the ciliate of the chimpanzee, the production of the small conjugants and the process of conjugation and the details of nuclear reorganization. The process of endomixis described by CUNHA and MUNIZ (1930) for *Bal. simile* of *Macacus rhesus* is regarded as merely the normal process of macronuclear reorganization after conjugation. *C. M. W.*

HERTIG (Arthur T.). **Sarcosporidia in the Myocardium of a Premature Infant. Report of a Case.**—*Amer. Jl. Path.* 1934. May. Vol. 10. No. 3. pp. 413–418. With 1 plate. [23 refs.]

The infant referred to died 26 days after birth, the sarcosporidia being found during the examination of microscopic sections of the heart. As the stage of development of the parasite corresponded with the parasites in experimental sarcosporidiosis of animals on the 26th to 29th day, it is concluded that infection of the infant may have occurred soon after birth. *C. M. W.*

MAYER (Martin). Ein neuer, eigenartiger Blutparasit des Affen (*Entopolypoides macaci* n. g. et n. sp.). [**A New Blood Parasite of Monkey** (*E. macaci*).]—*Zent. f. Bakt.* I. Abt. Orig. 1934. Apr. 5 Vol. 131. No. 3/4. pp. 132–136. With 31 coloured figs. on 1 plate.

In the blood of two Javanese monkeys (*Macaca irus*) the author has encountered a hitherto undescribed parasite in the red blood corpuscles. In the smallest stages it resembles the rings of the subtertian malarial parasite but in the larger forms it is exceedingly irregular in shape and provided with fine processes which terminate in swellings which appear to be attached to the surface of the cell. During the movements of the living parasites these points appear to be fixed. No forms to be distinguished as gametocytes could be detected. There is no pigment in the parasite, which on this account would seem to be related to the piropiasms such as *Babesia avicularis* or *B. decumani*, neither of which, however, is provided with the peculiar knobbed processes. The chromatin in the parasite in Giemsa stained films is in the form of one or two small red granules. Reproduction would appear to be by binary fission. The parasite is readily inoculable from monkey to monkey but not to other animals. Even when the infection is a heavy one it seems to have little effect on the health of its host. On account of its distinctive characters, which are clearly shown in the coloured plate accompanying the paper, the author proposes to name it *Entopolypoides macaci* n. g. et sp. *C. M. W.*

SCHWETZ (J.). Sur la présence de certaines inclusions globulaires dans le sang des cobayes et leur ressemblance avec certaines formes de *Bartonella muris ratti*. [**Globular Inclusions in the Blood of Guinea-pigs resembling** *Bart. muris ratti*.]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 515–522. With 2 figs.

The claims of KLEIN, LOPATIZKI and SOLITERMAN (1930) that they had infected guineapigs with the Bartonella of the rat, led the author

to repeat the experiments in Stanleyville. He obtained no infection of the guineapigs and suggests that the small coccoid bodies and minute piroplasmalike structures which are known to occur in the red cells of normal guineapigs, particularly young animals, have been misinterpreted as evidence of infection with the rat parasite. Attention was called to the occurrence of these structures in normal guineapigs many years ago by LOW and WENYON (1914) when they were described under the name of *Paraplasma flavigenum* by SEIDELIN, as evidence of the infection of these animals with yellow fever. *C. M. W.*

KIKUTH (Walter). **The Bartonella and Related Parasites in Man and Animals (Oroya Fever and Verruga Peruviana).**—*Proc. Roy. Soc. Med.* 1934. July. Vol. 27. No. 9. pp. 1241–1249 (Sect. Trop. Dis. & Parasit. pp. 57–65).

This is a general article on the subject of the title, very similar to an earlier one which has been reviewed in this *Bulletin*, Vol. 30, p. 572 and p. 818. In connexion with the therapeutic action of arsenic-antimony compounds on *Bartonella muris* infection in rats, it is mentioned that a very potent drug is Std. 386 B, which has the remarkable chemotherapeutic index of 1 : 3,500. [See this *Bulletin*, Vol. 30, pp. 572 & 818.]

C. M. W.

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SÉGUY (E.). Destruction des moustiques.—*Ann. d'Hyg. Pub. Indust. et Sociale.* 1934. July. Vol. 12. No. 7. pp. 421–431.

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